BIODIVERSITY ON THE FRINGE:

the (dis)integration of biodiversity in land use planning

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GLOSSARY OF ACRONYMS

ABS	Australian Bureau of Statistics
ACDC	Assessment Committee for Dam Construction
ANOVA	One-way analysis of variance
CAQDAS	Computer-assisted qualitative data analysis software
DAC	*Eucalyptus amygdalina* coastal forest and woodland
DAS	*Eucalyptus amygdalina* forest and woodland on sandstone
DGL	*Eucalyptus globulus* dry forest
DOB	*Eucalyptus obliqua* dry forest
DOV	*Eucalyptus ovata* forest and woodland
DPIPWE	Department of Primary Industries, Parks, Water and Environment
DPU	*Eucalyptus pulchella* dry forest
DTO	*Eucalyptus tenuiramis* forest on sediments
DVG	*Eucalyptus viminalis* grassy forest and woodland
DVS	*Eucalyptus viminalis* shrubby/heathy forest
EMPCA	*Environmental Management and Pollution Control Act 1994*
EPA	Environment Protection Authority
EPBCA	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically sustainable development
FPA	Forest Practices Authority
FPO	Forest Practices Officer
FPS	Forest Practices System
GIS	Geographic information system
HCV	High conservation value
HSD	Honestly significant difference
KIPS 2015	Kingborough Interim Planning Scheme 2015
KPS 2000	Kingborough Planning Scheme 2000
LGA	Local government area
LPS	Local Provisions Schedules
LUPAA	*Land Use Planning and Approvals Act 1993*
NAC	Natural Assets Code
NAD	*Acacia dealbata* forest
NCA	*Nature Conservation Act 2002*
NGO	Non-government organisation
NRM	Natural resource management
NRP	Natural Resource Planning

NVA	Natural values atlas
PAL	State Policy on the Protection of Agricultural Land 2009
PAMA	Public authority management agreement
PC	Principle components
PCA	Principle components analysis
PCAB	Policy Conservation Advice Branch
PD1	Planning Directive No. 1
PI	Photo-interpretation
PNFE	Permanent Native Forest Estate
PTR	Private Timber Reserve
REM	Regional Ecosystem Model
RMPAT	*Resource Management and Planning Appeal Tribunal Act 1993*
RMPS	Resource Management and Planning System
SAP	Specific area plan
SPP	State Planning Provisions
SSQ	Site Specific Qualification
SQL	Structured Query Language
TNVC	Threatened native vegetation communities
TPC	Tasmanian Planning Commission
TPS	Tasmanian Planning Scheme
TSPA	*Threatened Species Protection Act 1995*
TVMMP	Tasmanian Vegetation Monitoring and Mapping Program
UGA	Urban growth area
VCA	Vegetation Condition Assessment
WGL	*Eucalyptus globulus* wet forest
WOB	*Eucalyptus obliqua* with broad-leaf shrubs
WMA	*Water Management Act 1999*

ABSTRACT

Legislative frameworks for biodiversity conservation and land use planning are well-established at all scales of government in many parts of the world, however institutional arrangements for implementation are often devolved to the local level. Key drivers of biodiversity loss include native vegetation clearance, fragmentation and degradation of habitat for development. Effective biodiversity conservation therefore relies upon the integration of biodiversity into local land use planning and development control frameworks. This thesis addresses the question: *can and does local land use planning achieve effective biodiversity conservation outcomes*? To answer this question, a comprehensive appraisal was undertaken of the importance, contribution and effectiveness of land use planning frameworks and instruments in Tasmania in achieving biodiversity conservation. The appraisal was conducted using a mixed-methods, multiple-case study research design, including a collective case study and an instrumental case study.

The purpose of the statewide collective case study was to understand the role and relevance of land use planning in biodiversity conservation in Tasmania, including variation between planning instruments and over time. The statewide case study involved: (i) a survey of local government practitioners and semi-structured interviews with key players across sectors, to obtain a range of perspectives on the role and effectiveness of land use planning in biodiversity conservation; (ii) content analysis of all planning schemes, to obtain a detailed understanding of how statutory planning schemes integrate biodiversity, the biodiversity considered and variation between schemes and over time; (iii) spatial data analysis to quantify where biodiversity is subject to assessment, where biodiversity is at risk without consideration and how these vary between planning schemes and in response to planning reform; and, (iv) integrated analysis combining the results of the content analysis and spatial data analysis.

The purpose of the instrumental case study of the Kingborough local government area was to evaluate the effectiveness of biodiversity conservation actions at the local scale. This local case study involved: (i) an audit of biodiversity loss and gains resulting from development approvals; (ii) an audit of offsets secured as a condition of development approval; and, (iii) compliance and ecological monitoring of areas protected as a condition of approval.

Key findings from the statewide case study demonstrate integration of biodiversity conservation into land use planning in Tasmania is inconsistent, contested and in a state of flux. There are no agreed objectives, surrogates or indicators for biodiversity, policy settings are lacking, decision-support tools are not fit-for-purpose and strategic planning mechanisms are unable to secure biodiversity outcomes. Notwithstanding, the Kingborough case study demonstrates local planning schemes, as the last line of defence, can and do make an important contribution to biodiversity conservation. However, current planning reforms threaten to erode this contribution, as a result of extensive exclusions, weakened performance criteria and restrictions on local variation. Without amendment to planning provisions and legislation, as well as increased resourcing, the move towards a consistent statewide approach will see biodiversity conservation reduced to a procedural consideration, creating an illusion of biodiversity conservation, without requiring or clearly providing for biodiversity conservation outcomes.

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Biodiversity conservation, as an objective and an outcome, is enshrined in environmental legislation and mandated in decision-making processes around the world (Bates 2013:307; Brownlie & Botha 2009; Christensen 2007; European Commission 2011; Ives et al. 2010; Quétier, Regnery & Levrel 2014). The importance of biodiversity conservation is embedded at the global scale through international agreements and treaties, notably the 1992 Convention on Biological Diversity (United Nations 1992b). However, the translation of a global commitment into action relies upon the laws and regulations specific to each jurisdiction (United Nations 1992a).

Clearance, fragmentation and degradation of native vegetation and habitat for development are key drivers of biodiversity loss (Allchin, Kirkpatrick & Kriwoken 2013; Bekessay et al. 2012; Buxton et al. 2006; Fallding 2004; Farrier, Kelly & Langdon 2007; Field, Burns & Dale 2012; Ives et al. 2010; Preston 2016; State of the Environment Committee 2011; Webb 2009). Therefore, one of the most important pieces of environmental legislation in each jurisdiction is that which governs environmental planning and development (Bates 2013).

While legislative frameworks for biodiversity conservation and land use planning are established at the national and state scales, the institutional arrangements for implementation are often devolved to the local or regional scale (Quétier, Regnery & Levrel 2014; Tarlock 1993). In France, global agreements (United Nations 1992b) and European directives on biodiversity conservation (European Commission 2011) have been translated into national law, however the burden of operationalising these laws has been devolved to regional permitting authorities and/or local governments who must design their own solutions (Quétier, Regnery & Levrel 2014). Similarly, in the United States, biodiversity protection is decentralised and relies upon regulation of land use, which is the responsibility of local units of government (Miller et al. 2008; Tarlock 1993). In the United Kingdom, although the conservation of biodiversity is recognised in policies at all geographic scales, local planning authorities are responsible for assessing impacts on biodiversity when making land use planning decisions (Latimer 2009). Similarly, although New Zealand has national environmental legislation, national-level policy guidance is lacking and it is the role of regional or local councils to regulate activities which may have an adverse effect on biodiversity (Brown et al. 2014). In South Africa, biodiversity regulation exists at both the national and provincial levels, with implementation of biodiversity measures, such as offsets, occurring at the provincial level (Brownlie & Botha 2009). Within Australia's federalist system, environmental or land use planning is a state-based activity, with most responsibilities then delegated to local government (Bates 2013; Willey 2007).

Effective biodiversity conservation therefore relies upon the integration of biodiversity into land use planning and development control frameworks at the local level. Planning schemes in particular, as the regulatory instrument for controlling land use planning decisions and biodiversity loss, are of fundamental importance in achieving biodiversity conservation outcomes (Bates 2013; Ives et al. 2010; Kelly & Farrier 1996; Southern Tasmanian Councils Authority 2013; State of Victoria 2013c; Williams & Maginn 2012). The importance, contribution and effectiveness of integrating biodiversity conservation into land use planning decisions and statutory planning instruments is the focus of this thesis.

1.1 Research context

While planning systems vary across jurisdictions, common to all environmental planning legislation in Australia is a commitment to the principles of ecologically sustainable development (ESD), including biodiversity conservation (Bates 2013:224; Ecologically Sustainable Development Steering Committee 1992; Ives et al. 2010; Peel 2008).[1] Conservation of biodiversity is therefore a fundamental consideration in decision-making under the definition of ESD adopted in Australia (Bates 2013) and should be the foundation of the decision-making process (Preston 2016). However, the mere inclusion of ESD as a principle within legislation does not necessarily result in substantive outcomes for biodiversity (Allchin, Kirkpatrick & Kriwoken 2013; Bates 2013; Dwyer & Taylor 2013; England 2005; Farrier, Kelly & Langdon 2007; Farrier, Whelan & Brown 2002; Ives et al. 2010; Peel 2008; Rackemann 2010; Robinson 2009; Taylor & Ives 2009). While biodiversity conservation is a fundamental consideration in decision-making, the definition of ESD does not make biodiversity a necessary component of ESD (Bates 2013; Rackemann 2013). As biodiversity conservation is just one of three core principles of ESD, 'decision-makers are able to lawfully make decisions that impact significantly and adversely on biodiversity' (Bates 2013:256). The potential for social and economic considerations to outweigh biodiversity impacts is also reflected in BGP Properties v Lake Macquarie City Council (138 LGERA 237 2004, *NSWLEC 399, [2004]*), where the Chief Justice made it clear that consideration of the principle of conserving biological diversity did 'not preclude a decision to approve an application in any case where the overall benefits of the project outweigh the likely environmental harm'. Biodiversity therefore remains 'simply one of many competing issues that have to be considered' (Allchin, Kirkpatrick & Kriwoken 2013:102). Consequently, despite the commitment to ESD and biodiversity conservation in theory, in practice social and economic factors can outweigh environment and biodiversity continues to decline (UNEP 2010, 2012).

Dwyer and Taylor (2013) provide a particularly useful examination of how the principles of ESD translate in practice, highlighting the difference between the procedural and substantive integration of ESD. When operating in its procedural sense, ESD provides a methodology for making decisions

[1] ESD was officially adopted in Australia in 1992 in response to Agenda 21 with the release of the National Strategy for Ecologically Sustainable Development (NSESD). While legal definitions of ESD differ between federal and state legislation, according to Bates (2013), most are fundamentally based on the definition of ESD agreed to by the Commonwealth, states and local government in the Inter-Governmental Agreement on the Environment (IGAE) 1992.

about proposed projects or activities that may have an adverse impact upon the environment if they are approved. Procedural integration of ESD then only requires the principle of biodiversity conservation to be adequately taken into consideration in the process of decision making, not the actual conservation of biodiversity per se. When operating in its substantive sense, ESD requires implementation of the principle of biodiversity conservation on the ground. In other words, when ESD is applied in the substantive sense, it needs to require actual biodiversity conservation outcomes.

Planning legislation and associated instruments only requiring the decision-maker to 'have regard' to biodiversity conservation limit the integration of biodiversity conservation to a procedural requirement, as distinct from having a 'duty' or legal obligation to further biodiversity conservation, which is a substantive requirement (Dwyer & Taylor 2013; England 2005; Environment Defenders Office (Qld) 2010b). Therefore, a pre-requisite for biodiversity conservation outcomes is the substantive integration of ESD into legislation and planning instruments. According to Bates (2013), Tasmania has perhaps the strongest requirements to promote ESD, with s8 of the *Land Use Planning and Approval Act 1*993 (LUPAA) placing an obligation on the consent authority to further the objectives set out in Schedule 1, which includes the promotion of ESD. While these requirements have not been tested, the strong requirements under LUPPPA provide a more explicit legal foundation for biodiversity conservation as an outcome than legislation in other jurisdictions.

Where the parent legislation fails to provide real guidance to decision-makers on how to apply the core principles of ESD, or what weight to give biodiversity conservation relative to economic and social considerations, statutory planning instruments further enable planning authorities to express more detailed requirements than may be prescribed by the legislation under which they are authorised (Bates 2013). Consequently, the integration of ESD into planning schemes, including the weight given to biodiversity conservation and the reflection of higher-order principles in development standards, can be fundamental to effective biodiversity conservation. In particular, achieving biodiversity conservation outcomes in peri-urban and urban areas relies on the provisions contained within individual planning schemes, as clearing in these areas is often exempt under State legislation (Bates 2013; Environment Defenders Office (Qld) 2010a; Environment Defenders Office (Vic) 2012; Farrier, Kelly & Langdon 2007; Field, Burns & Dale 2012; Rackemann 2010; Webb 2009).

The importance of land use planning in conserving biodiversity at risk of peri-urban development is established in the literature, with a focus on: the potential importance and limitations of strategic planning (McFarland 2015; Robinson 2009; Williams 2012), strategic environmental assessments (Bragagnolo & Geneletti 2013; Dales 2011; Koutsamanis 2011; Marsden 2013; Marsden 2006; Vicente & Partidario 2006; Whitehead, Kujala & Wintle 2017) and spatial conservation planning tools (Bekessay et al. 2012; Bragagnolo & Geneletti 2013; Cowling Richard & Wilhelm-Rechmann 2013; Gordon et al. 2009; Whitehead, Kujala & Wintle 2017). Many of these studies use case studies of specific jurisdictions or localities, including New South Wales (Ives et al. 2010; McFarland 2015;

Robinson 2009; Williams 2012), Melbourne (Bekessay et al. 2012; Gordon et al. 2009; McFarland 2015), Queensland (Marsden 2013), Perth (Whitehead, Kujala & Wintle 2017), Milan (Bragagnolo & Geneletti 2013) and Reunion Island (Lagabrielle et al. 2010).

There have also been numerous studies on the role of local government in land use planning and biodiversity conservation, however these studies have tended to be either general (Allen 1997; Fallding 2004; Margerum 1999) or focussed on detailed case studies in specific jurisdictions, such as Burnside in South Australia (Allen 1997), the Yarra Ranges (Powers 2000) and Wyndham (Bekessay et al. 2012) in Victoria, New South Wales (Ives et al. 2010; Kelly & Farrier 1996; Mamouney 2000; McFarland 2015), metropolitan Perth (Hamilton & Twycross 2010; Matthews 2010), and South-East Queensland (Field, Burns & Dale 2012; Peterson 2000; Rackemann 2010). Studies across multiple planning instruments and jurisdictions are more limited, with comprehensive content analysis of ordinances in multiple planning instruments undertaken by Reed, Hilty and Theobald (2013), who conducted content analysis of ordinance in 414 counties in the US to assess the adoption of permanent protection measures via development control, and Gurran, Gilbert and Phibbs (2015), who undertook content analysis of 291 local planning instruments in Australia to investigate the extent to which they contain specific policy goals and enforceable development controls relating to biodiversity conservation. In New Zealand, comprehensive studies have also been undertaken on compliance with consent conditions across 81 case studies (Brown et al. 2013a), stakeholder perspectives on ecological compensation measures (Brown et al. 2013b) and the effectiveness of ecological compensation (Brown et al. 2014).

With offsets increasingly relied upon as a mechanism for achieving substantive biodiversity outcomes, the complex issue biodiversity offsetting has been the focus of much of the literature (Allchin, Kirkpatrick & Kriwoken 2013; Bekessy et al. 2010; Bezombes et al. 2018; Brown et al. 2013a; Brown et al. 2013b; Brown et al. 2014; Brownlie & Botha 2009; Bull et al. 2015; Bull, Suttle, Gordon, et al. 2013; Bull, Suttle, Singh, et al. 2013; Calvet, Napoléone & Salles 2015; Carreras Gamarra, Lassoie & Milder 2018; Christensen 2007; Farrier, Kelly & Langdon 2007; Gibbons 2011; Gibbons et al. 2016; Guillet & Semal 2018; Ives et al. 2010; Kiesecker, Copeland, Pocewicz & McKenney 2009; Kiesecker, Copeland, Pocewicz, Nibbelink, et al. 2009; Maron et al. 2015; Maron et al. 2016; Maron et al. 2012; Maron, Rhodes & Gibbons 2013; McKenney & Kiesecker 2010; Moilanen et al. 2009; Moreno-Mateos et al. 2015; Peterson et al. 2018; Pickett et al. 2013; Pilgrim et al. 2013; Quétier & Lavorel 2011; Underwood 2011; Walker et al. 2009; Webb 2009). 'Biodiversity offsetting—compensating for losses of biodiversity at an impact site by generating ecologically equivalent gains elsewhere—places substantial faith in the ability of restoration to recover lost biodiversity' (Maron et al. 2012). Key concerns with relying on offsets to justify and compensate for the permanent loss of biodiversity include time lags, uncertainty, achieving additionality in the face of loss and the complexities in achieving equivalency between the value being offset and the value being protected (Allchin, Kirkpatrick & Kriwoken 2013; Bekessy et al. 2010; Bull, Suttle, Gordon, et al. 2013; Christensen 2007; Field, Burns & Dale 2012; Gibbons & Lindenmayer 2007; Maron et al. 2016; Maron et al. 2012; Peterson et al. 2018).

There has been substantial theoretical work on the requirements of offsets to achieve no net loss, and a number of complex methodologies for determining suitable offsets have been developed, such as Habitat Hectares in Victoria and the Environmental Outcomes Assessment Methodology in NSW. The general consensus in the literature is that, without improvements, offsets will not achieve their intended goal of no net loss (Brown et al. 2014; Curran, Hellweg & Beck 2014, 2015; Gibbons & Lindenmayer 2007; Gordon et al. 2015; Guillet & Semal 2018; Maron et al. 2015; Maron et al. 2016; Maron et al. 2012; Moreno-Mateos et al. 2015; Pickett et al. 2013; Walker et al. 2009). However, there has been limited research and monitoring to determine the effectiveness of offsets in achieving biodiversity conservation outcomes (Environment Defenders Office (Vic) 2012; Maron et al. 2012; Pickett et al. 2013)[2]. The effectiveness of offset policies therefore remains unclear (Peterson et al. 2018).

While the peer-reviewed literature on scientific issues associated with offsets is growing rapidly, there is limited research into the regulatory frameworks in which biodiversity offsets are integrated (Dupont 2017) or the practical application and effectiveness of offsets at the local level (Curran, Hellweg & Beck 2015). Within Australia, research on the use of offsets has focussed on New South Wales and Victoria and there has also been no systematic analysis or review of the use of and outcomes from offsets within Tasmania or the protection mechanisms used to secure offsets and other biodiversity gains. Literature on land use planning and biodiversity conservation within the jurisdiction of Tasmania has focussed on the effectiveness of conservation law and policy across all tiers of government in relation to particular biodiversity values, including RAMSAR wetlands (Prahalad & Kriwoken 2010), the endangered Swift Parrot (*Lathamus discolour)* (Allchin, Kirkpatrick & Kriwoken 2013) and terrestrial native vegetation (Harris 2011).

It is evident from the literature that further research is required to understand integration of biodiversity in land use planning in a procedural and substantive sense, and the effectiveness of the land use planning process and statutory planning instruments in contributing to biodiversity conservation outcomes. There is also the need for further research on the role and effectiveness of offset programs in achieving biodiversity conservation in practice and their integration within the broader land use planning framework. While Tasmania is considered to have some of the strongest legislation establishing an obligation to further ESD and biodiversity conservation, and would

[2] One of the few studies on the effectiveness of offsets investigated a habitat offset created to compensate for impacts on a population of the threatened green and gold bell frog (*Litoria auerea*) at Sydney Olympic Pond (Pickett et al. 2013). While the offset involved extensive attempts to increase habitat availability at the development site, achieving no net loss in population required a 19-fold increase in pond area away from the development site (Pickett et al. 2013).

therefore appear well placed to meet this challenge, research within this jurisdiction is limited (Allchin, Kirkpatrick & Kriwoken 2013; Harris 2011; Prahalad & Kriwoken 2010) (section 1.1.1).

1.2 My unique contribution and research purpose

To address these research gaps, this study asked the question: *can and does land use planning achieve effective biodiversity conservation outcomes?* To answer this question, I used a mixed-methods multiple case study approach, to undertake a comprehensive appraisal of the importance, contribution and effectiveness of land use planning frameworks and instruments in Tasmania in achieving terrestrial[3] biodiversity conservation outcomes. This study spanned: all stages of the land use planning process, from the strategic through to implementation; at multiple scales, from the statewide, to the regional, local and site specific, rural and urban; across all statutory planning schemes; and, over two phases of planning reform.

Using a multiple case study approach, including a statewide collective case study and an instrumental case study of the Kingborough local government area (LGA), the purpose of this research was to:

(i) establish the role and contribution of land use planning to biodiversity conservation;

(ii) review the procedural and substantive integration of biodiversity conservation in land use planning frameworks and instruments within Tasmania and how this varies between regulators, planning schemes and over time;

(iii) evaluate the effectiveness of statutory planning instruments and associated protection mechanisms, including offsets and legal on title agreements, in addressing biodiversity impacts and contributing to biodiversity conservation outcomes; and,

(iv) identify key elements and reforms for the effective integration of biodiversity in land use planning.

Within the scope of this research, I am interested in: *objects* (biodiversity); our *values* in relation to these objects (what biodiversity we consider the be more or less important and according to whom); the *rules* we use to regulate impacts of development on these (statutory planning instruments); our interpretations (scientific, policy, legal) of these *objects*, *values* and *rules* by *institutions* (government, the judicial system) and *social actors* (planners, scientists, consultants, lawyers); and, the *interactions* between all of these factors and the extent to which these interactions facilitate or undermine effective biodiversity conservation (Mason 2002). To investigate these ontological properties required a multi-disciplinary approach, utilising quantative methods to investigate the physical 'object' of biodiversity, where it is located, where it is impacted and where it is protected as the result of the development approval process; and, qualitative methods to investigate questions related to valuing biodiversity, rules for protecting these values, the interpretation of the rules and the interaction of values, rules and

[3] Aquatic and marine biodiversity are beyond the scope of this research.

interpretations to facilitate or undermine effective biodiversity conservation. The scope of the research (investigating the integration of biodiversity conservation in land use planning, between and within regulators, across and within planning schemes, at multiple scales, throughout the life-cycle of the land use planning process, over time), the method (a multi-disciplinary, mixed-methods approach), and the case examples (Tasmania and Kingborough), all make this research original.

1.3 A road map to thesis

This thesis comprises four parts (Table 1.1). Part I provides the context for the research, including a brief literature review (Chapter 1) and methods (Chapter 2). Parts II and III present the results of the statewide collective case study. Part II sets the scene, situating land use planning within the broader regulatory framework for biodiversity conservation and introducing the role of statutory planning schemes in biodiversity regulation and conservation (Chapter 3). While it is principally contextual, Chapter 3 is the first of the substantive chapters, investigating integration of biodiversity conservation *between* systems, regulators and planning schemes in Tasmania.

Part III examines regulation of biodiversity *within* the planning system and associated statutory planning instruments over time (Chapter 4-7). Chapter 4 categorises planning schemes according to concepts of biodiversity, distinguishing variation and identifying gaps. Chapter 5 examines the extent of biodiversity consideration in practice, quantifying the extent of biodiversity subject to the rules, the extent of exemptions, and variation between schemes over time. Impacts on biodiversity, including issues of data reliability, identification, classification and interpretation, are examined in Chapter 6. Part III concludes with analysis of the criteria used to determine when loss is acceptable (Chapter 7).

Part IV presents the Kingborough case study, evaluating the effectiveness of biodiversity conservation actions at the local scale, including the extent of loss relative to gain, the role of offsets and the effectiveness of protection mechanisms imposed via planning permit conditions (Chapter 8). Part V is the final synthesis chapter, distilling the central attributes of effective integration of biodiversity conservation identified in the research, evaluating current land use planning processes in relation to these attributes, and identifying interventions to improve the substantive integration of biodiversity conservation into land use planning in Tasmania.

The research findings are presented and discussed within each substantive chapter (Chapters 3-8) rather than separating the thesis or the chapters into results and discussion. The thesis is also structured to move from the general and contextual to the local and particular. This structure reflects the hierarchy of the land use planning process, from the regulatory, to the strategic, to the statutory instrument, to the assessment and decision-making process, to implementation. Furthermore, the structure reflects the different scales at which biodiversity needs to be considered, depending upon the requirements and characteristics, from the national, to the statewide, to the landscape and bioregional, to the local to the site specific.

1.4 Conclusion

The importance of integrating biodiversity conservation into statutory land use planning has long been recognised. The concept of ESD provides a useful theoretical and legal framework for understanding how biodiversity is integrated into the land use planning process both procedurally and substantively. Despite the inclusion of ESD and principles of conserving biological diversity in planning systems across Australia, biodiversity continues to decline and decisions continue to preference economic development at the expense of biodiversity. The literature indicates that current regulatory approaches to ESD and biodiversity conservation focus on procedural integration at the expense of substantive integration, undermining ESD (Bates 2013; Peel 2008; Preston 2013). The literature also demonstrates most research on the integration of biodiversity into land use planning has been focussed on New South Wales, Queensland and Victoria.

It is evident from the literature that further research is required to understand how biodiversity is integrated into land use planning in a procedural and substantive sense, and the effectiveness of the land use planning process, statutory planning instruments and biodiversity offsets in contributing to biodiversity conservation outcomes. The present research provides the first comprehensive appraisal of the procedural and substantive integration of biodiversity conservation across all environmental planning instruments over time and at multiple scales.

Table 1.1 A road map to the thesis

SCALE	SCOPE	KEY QUESTIONS	
INTERNATIONAL, NATIONAL & STATE	**PART I: SITUATING THE RESEARCH**		INTRODUCTORY CHAPTERS
	Chapter 1: Biodiversity conservation – procedural requirement or substantive outcome		
	Situates the research within the literature, establishes my contribution and research purpose and provides a road map to the thesis.	What does the literature say about the integration of biodiversity conservation into land use planning? What is established? What are the issues? Where are the gaps? What is my unique contribution?	
	Chapter 2: Methodology		
	Summarises my mixed-methods approach in relation to the key research questions, details each method, including analysis and interpretation, and identifies the limitations of the research.	Why did I choose the method? How did I select the participants/cases? How did I collect the data? How did I manipulate the data I collected? How did I analyse the data? How did I deal with errors/bias?	
STATE, REGIONAL & LOCAL	**PART II: STATEWIDE CASE STUDY – SETTING THE SCENE**		SUBSTANTIVE CHAPTERS
	Chapter 3: The regulatory context of biodiversity conservation in Tasmania		
	Provides an overview of the regulatory framework for biodiversity conservation in Tasmania, including the rules, the regulators and their roles; introduces the land use planning system and how it interacts with other regulatory systems; and, establishes the changing role of statutory planning schemes in biodiversity regulation and conservation.	What is the regulatory framework for biodiversity conservation in Tasmania? What is the role of land use planning and statutory planning authorities in biodiversity conservation? How does land use planning integrate with other regulatory systems? To what extent do planning schemes integrate biodiversity conservation?	
WITHIN AND BETWEEN LOCAL	**PART III: STATEWIDE CASE STUDY – INTEGRATION OF BIODIVERSITY INTO STATUTORY PLANNING INSTRUMENTS**		
	Chapter 4: Concepts of biodiversity in theory		
	Categorises planning schemes according to concepts of biodiversity identified, describes the variation in planning schemes based on the categorisation of concepts; and, examines how these concepts are translated into the operation of planning instruments procedurally and substantively.	How is biodiversity conceptualised and operationalised in planning schemes? Where are the gaps?	
	Chapter 5: Concepts of biodiversity in practice		
	Examines the extent that biodiversity rules apply and the extent of exemptions under interim planning schemes to identify where biodiversity is and is not able to be considered, how this changes with planning reform and therefore what biodiversity is at greatest risk.	Where can biodiversity be considered? Where is biodiversity at risk from development? Why is integration of biodiversity important in land use planning?	
	Chapter 6: Concepts of biodiversity impacted		
	Identifies issues associated with determining impact, including: sources of information; identification, classification and interpretation of values; the role of the suitably qualified person; and, the implications for biodiversity conservation.	How are impacts on biodiversity identified and determined? According to whom? How are issues of interpretation, scale and uncertainty addressed?	
	Chapter 7: Determining what stays and what goes: assessment criteria		
	Analyses the standards used in the biodiversity-related codes under interim schemes and how these change under planning reform, including the rules used to determine whether loss is acceptable and the integration of the mitigation hierarchy.	How do statutory instruments integrate biodiversity into the decision-making process? How do current statutory planning instruments balance competing values? In which contexts are biodiversity protected? According to what criteria?	
LOCAL & SITE SPECIFIC	**PART IV: KINGBOROUGH CASE STUDY – EFFECTIVENESS OF STATUTORY PLANNING**		
	Chapter 8: Achieving effective outcomes for biodiversity conservation		
	Evaluates the effectiveness of biodiversity conservation actions at the local scale, including the extent of loss relative to gain, the role of offsets and the effectiveness of protection mechanisms imposed via planning permit conditions.	What has been lost, what has been gained and what is at risk? Do offsets and protection mechanisms work? Can statutory planning instruments achieve biodiversity conservation outcomes?	
STATE & LOCAL	**PART V: SYNTHESIS**		CONLCUSION
	Chapter 9: An evaluation of effective integration of biodiversity conservation in land use planning in Tasmania		
	Distils central attributes for the effective integration of biodiversity conservation in land use planning, evaluates current land use planning processes in relation to these attributes, and identifies interventions to improve the substantive integration of biodiversity conservation into land use planning in Tasmania.	What are the elements of effective biodiversity regulation throughout the land use planning process? How effective are current approaches in achieving biodiversity conservation outcomes, procedurally & substantively? Where does biodiversity conservation break down in translation from objectives to outcomes? What interventions and reforms are required?	

Chapter 2 - Methodology

Traditionally, the discipline of geography made a strict distinction between objective and subjective knowledge (Mansvelt & Berg 2010:335). Objective knowledge is derived via quantitative methods and is seen as scientific, rigorous, detached and consequently valid. It is constituted in opposition to subjective knowledge, gathered using qualitative methods, which is personal, value-based, non-scientific, and non-academic (and therefore unacceptable as a basis for establishing 'the' truth) (Mansvelt & Berg 2010:335). Qualitative research was seen as subjective, and quantitative research as objective; qualitative research interprets and makes anecdotal comments about reality, whereas quantitative research discovers ‘reality’. While geography has its origins in the positivist quantitative tradition (Mansvelt & Berg 2010), over the last two decades the pendulum has swung and the adoption of a mixed-methods approach is increasingly prevalent (Hay 2010). It is also increasingly accepted that quantitative methods are not inherently objective or value-free (Hay 2010:12).

Reflective of current approaches in geography, I adopted a mixed-methods research design, incorporating multiple case studies and utilising qualitative and quantitative methods (Table 2.1). The advantages of qualitative methods are that they can be used with small sample sizes (Zikmund et al. 2010) and can provide a higher level of validity (Babbie 2013). However qualitative methods are limited in relation to reliability and generalizability and are not appropriate for arriving at statistical descriptions of a large population (Babbie 2013) Quantitative methods provide a high level of reliability and generalizability but a low level of validity (Babbie 2013; Zikmund et al. 2010). While qualitative and quantitative methods have differing strengths and weaknesses, they constitute alternative, but not mutually exclusive, strategies for research and can be used in the same study (Patton 2002).

The use of multiple case studies, including a collective case study and an instrumental case study, as a strategy of inquiry (Flyvberg 2011) enables the research questions and data to be examined at a range of scales (from statewide to local, to site and species specific). A collective case study (Stake 2005) enables the questions to be examined across all jurisdictions and local government areas (LGAs) in Tasmania, incorporating multiple voices and sources of data (Table 2.1). The collective case study is grounded in an instrumental case study of one LGA (Denzin & Lincoln 2011; Stake 2005). This research strategy provided a comprehensive understanding of the integration of biodiversity conservation into land use planning while also enabling an in-depth examination of the effectiveness of biodiversity conservation actions at the local scale within one jurisdiction.

In this chapter I detail my mixed-methods case study approach, including an overview of the methodology for each case study, the purpose of methods employed, how I selected participants or cases, data collection, analysis and interpretation, and how I dealt with errors or bias.

Table 2.1 Summary of methods and their purpose, analysis and outputs in relation to key research questions

Method	Purpose	Key research questions	Analysis	Outputs	Number of cases	Number of fields
Tasmanian case study (chapters 3-7)						
Local government survey (Chapters 3, 6-7)	Obtain a preliminary snapshot of the role of local government and views on how biodiversity is and should be integrated into local land use planning.	Where is biodiversity conservation integrated into local land use planning? Whose role is it to regulate impacts of development on biodiversity? What is the role of land use planning and statutory planning authorities in biodiversity conservation? What biodiversity values are/should local government be protecting and why?	Content analysis of open-ended survey responses by coding and categorising content and identifying themes. Basic frequencies of response to closed questions in Excel to identify trends and patterns.	NVIVO database of open-ended responses. Excel database of open-ended responses	34	106
Semi-structured interview (Chapters 3-7)	Provide an understanding of the different perspectives and interpretations of the role and effectiveness of land use planning in biodiversity conservation.	Is development recognised as a driver of biodiversity decline? Are current regulatory approaches achieving effective biodiversity outcomes? What are the challenges/limitations of current approaches? What values are important at the local scale? What values are at risk? In which contexts should they be protected? According to what criteria? Does local government have a role in regulating impacts on these values? What are the elements/components of effective biodiversity regulation?	Content analysis of interviews by coding and categorising content and identifying themes. Descriptive frequencies and statistical relationships between characteristic attributes and responses using SPSS and Mini-tab.	NVIVO interview database.	36	508
Content analysis of statutory planning schemes (Chapters 4-5, 7)	Provide a detailed understanding of how statutory planning schemes integrate biodiversity.	How do statutory instruments integrate biodiversity into the decision-making process? What concepts of biodiversity are identified as relevant? How do current statutory planning instruments balance competing values? In which contexts is biodiversity loss acceptable? According to what criteria?	Content analysis of planning scheme provisions using matrix coding of characteristic attributes by coding of content into nodes. Results exported into SPSS and Mini-tab for exploration of relationships between characteristic attributes and views.	NVIVO statutory instrument database.	30	430
Spatial data analysis (Chapter 5)	Quantify where biodiversity is subject to assessment, where biodiversity is beyond consideration and how this varies between planning scheme areas and changes as a result of planning reform.	Where is biodiversity subject to assessment? Where is biodiversity excluded from assessment? How does this change under the State Planning Provisions?	Biodiversity data was clipped, generalised and then split according to LGA, region, zone, code and extent to enable quantification using Structured Query Language (SQL).	Excel spreadsheet of the extent and percentage of mapped biodiversity surrogates by LGA.	29	variable
Integrated analysis (Chapters 4-7)	Identify variation in integration of biodiversity into planning schemes and relate this variation to demographic and spatial attributes. Evaluate the effectiveness of planning schemes in achieving biodiversity conservation outcomes.	What is the variation between planning schemes and how can this be explained? Are there significant relationships between the content in planning schemes, the application of zones and codes, the geographic extent of biodiversity and demographic data? How effective are planning schemes in achieving biodiversity conservation outcomes, procedurally & substantively? Where does integration of biodiversity conservation break down in translation from objectives to outcomes?	Principle components analysis (PCA), one-way analysis of variance (ANOVA), chi-square test for independence and correlation depending upon the data type (continuous or class).	An integrated database combining the results of the content analysis and spatial data analysis with characteristic and demographic data according to LGA.	29	671
Kingborough case study (Chapter 8)						
Audit of loss, gain and risk in the UGA (Chapter 8)	Quantify the scale and scope of the issue. Provide empirical evidence on the extent of loss.	What has been lost, what has been gained and what is at risk? Can statutory planning instruments achieve biodiversity conservation outcomes?	Comparison of satellite imagery from 2005-2015 with Council data and Statewide data to identify native vegetation cleared, protected, remaining and at risk. Results exported into SPSS and Mini-tab for descriptive frequencies and exploration of relationships to identify significance in loss relative to gains over time and under different regulatory regimes.	Shapefile of native vegetation loss, gain and risk from 2000-present within the UGA.	58	28
Audit of biodiversity loss and gains subject to offsets (Chapter 8)	Provide empirical evidence on the role and effectiveness of biodiversity offsets at the local level.	How effective are offsets? Are they practical? Do they increase loss?	Comparison of satellite imagery from 2005-2015 with Council data and Statewide data to identify native vegetation cleared, protected, remaining and at risk. Results exported into SPSS and Mini-tab for descriptive frequencies and exploration of relationships to identify significance in loss relative to gains over time and under different regulatory regimes	Excel database of all approved development applications involving offsets from 2000-2018.	187	81
Audit of areas protected through the development approval process (Chapter 8)	Provide empirical evidence on the role, contribution and effectiveness of protection mechanisms imposed via planning permit conditions in achieving biodiversity outcomes.	Do offsets and protection mechanisms work? How effective are current approaches in achieving biodiversity conservation outcomes, procedurally & substantively? Can statutory planning instruments achieve biodiversity conservation outcomes?	Exported into MapInfo and SPSS for descriptive frequencies and exploration of relationships between variables.	Summary spreadsheet of all monitoring results by site and assessment. Detailed monitoring data for each site.	18	67

2.1 A Tasmanian case study

The Tasmanian case study provides a comprehensive analysis of the role of land use planning in biodiversity conservation across all LGAs in the state, the intersection of land use planning and planning schemes with other regulators, and variation between planning schemes and over time. Like other jurisdictions in Australia, Tasmania has been experiencing repeated cycles of planning reform. These cycles of reform have seen the transition from more than 29 individual planning schemes (pre-interim schemes), to 3 regional model schemes with local variation (interim schemes), to the Tasmanian Planning Scheme, which is comprised of the State Planning Provisions (SPPs) and Local Provisions Schedules (LPSs) (Figure 2.1). Consequently, the integration of biodiversity conservation in statutory planning instruments in Tasmania has shifted throughout the research process (Figure 2.1). To evaluate the implications of planning reform for biodiversity conservation, the Tasmanian case study includes analysis of pre-interim schemes, interim schemes and the Tasmanian Planning Scheme.

Methods of data collection for the Tasmanian case study included: (i) a survey of local government experts (section 2.1.1); (ii) semi-structured in-depth interviews with key experts across organisations and scales (section 2.1.2); (iii) content analysis of statutory planning instruments across time and LGAs (section 2.1.3); (iv) a comparative spatial analysis of biodiversity values relative to planning scheme provisions and exemptions (section 2.1.4); and, (v) integrated analysis (section 2.1.5) (Table 2.1). Each of these methods is detailed below.

2.1.1 Survey of local government

Purpose

To obtain a preliminary snapshot of the role of local government[4] in regulating impacts of use or development on biodiversity in Tasmania and identify the extent to which biodiversity is integrated into local government statutory planning, an online survey of all 29 local Councils was undertaken. An online survey using a strategic sampling method was selected as an appropriate mechanism for capturing a range of views across the sample population (Mason 2002). The sample population comprised Council staff with a role in land use planning, biodiversity regulation and/or natural resource management across all LGAs in Tasmania. This approach ensured I captured a meaningful range of views from a small sample size, enabling me to make key comparisons and to develop and test theories on the extent to which biodiversity is integrated into land use planning in Tasmania (Mason 2002).

[4] The terms local government and Council are used interchangeably throughout the thesis. When local government is undertaking its statutory land use planning functions conferred under legislation, they are also referred to as a planning authority.

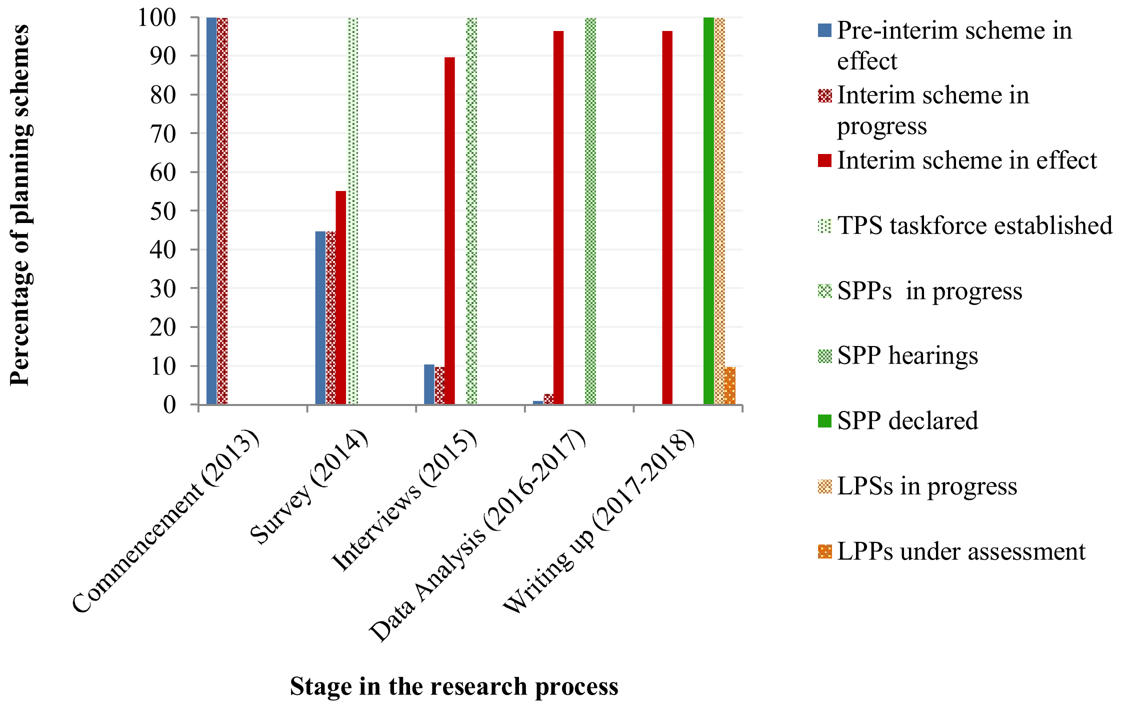

Figure 2.1 The status of statutory planning instruments during different stages of the research process

The survey questions captured demographic data on the respondent as well as their responses to questions on: the contribution of development to biodiversity decline; the role of land use planning; the integration of biodiversity in the land use planning process; use of data and expert advice; and, the roles of, and integration between, different regulators. The survey questions were developed and tested with a subset of the target audience prior to the instrument's delivery online. Data from the pilot was not used in the research. The questions were designed to capture a range of data types, including nominal, ordinal and ratio data. A copy of the survey questions is included in Appendix I.

Participant selection

Respondents for the survey were invited from all 29 Tasmanian Councils via email using publicly available contact details and generic Council email addresses. The cover email requested the survey be forwarded to any relevant Council managers and officers involved in statutory planning, environmental planning and natural resource management (NRM). All potential respondents were provided with an information sheet and participation in the survey was taken as consent. Ethics approval was obtained for the survey (Ethics Ref: H0013835). Two follow-up emails were sent following the original email to improve the participation rate (Walter 2010).

Data collection and manipulation

Data were collected using SurveyMonkey® as it was an accessible and known survey platform and enabled easy export of the data. The survey comprised a series of closed and open-ended questions. Closed-ended questions required respondents to select an answer from a list of standardised response categories (Babbie 2013). These questions and the associated response categories were derived from key themes and issues identified in the literature and from my experiences as an environmental planning practitioner. To ensure the list of response categories was exhaustive, respondents had the option of selecting an 'Other' category for closed-ended questions (Babbie 2013). The survey also included a number of open-ended questions, which took the form of comments boxes in relation to key themes. These open-ended questions enabled the respondent to provide his or her own responses and therefore provided an opportunity for new issues and themes to emerge (Babbie 2013).

In total 34 complete responses were received from 20 (70%) of the 29 Councils. The majority of respondents were either statutory planners (n = 10, 29%) or NRM officers (n = 9, 26%). Eighteen percent (n = 6) of respondents indicated they did not fit into one of the identified roles and described their roles as Bushfire Risk Management, Climate Change, Compliance or Natural Area Planning. In order of frequency, responses were also received from Managers of Planning (n = 4, 11%), Strategic Planners (n = 3, 9%), Environmental Planners (n = 2, 6%) and Managers of NRM (n = 2, 6%). Over 80% (n = 29) of respondents had been in their roles for over one year, and over half of these had been in the role for greater than 5 years. Data were exported and collated in Microsoft Excel.

Data analysis

Given the small sample size and the timing of the survey, which was early in the research process and mid-way through the change from pre-interim to interim schemes, the survey was utilised as a preliminary snapshot. Consequently, analysis of closed questions was limited to basic frequencies of responses in relation to characteristic attributes including role, region and planning scheme in effect using Excel.

Analysis of the open-ended questions involved the use of Computer-assisted qualitative data analysis software (CAQDAS), specifically QSR N-VIVO 10. CAQDAS is designed to help in the analysis of data by storing, managing and presenting data in written form (Thompson 2002). While CAQDA is a useful tool for assisting with management, retrieval and analysis of qualitative data, and for supporting the coding process (Wickham & Woods 2005), it is not an analytic strategy in its own right (Thompson 2002). The process of qualitative data analysis involves a dynamic relationship between researcher and data. The researcher needs to tell the computer what to do and not vice versa (Thompson 2002).

Analysis of the qualitative survey data involved a four-step process of data immersion, coding, creating categories and identification of themes (Green et al. 2007). Data immersion involved reviewing the open-ended responses in the context of the survey question to provide context for the responses and inform the second step of coding into nodes. Coding refers to the process by which data are organised or transformed into a standardised category which is intended to represent the meaning in the data (Babbie 2013; Mason 2002; Zikmund et al. 2010). Nodes refer to repositories for coding and enable related material to be stored in one place so emerging patterns and ideas can be identified (QSR International 2014). I used inductive logic to undertake analytic coding to develop nodes reflecting what the content is really about (QSR International 2014). Inductive logic is a way of developing theory that begins with observing the data and then identifying patterns and processes as they emerge (Babbie 2013; Glaser & Strauss 1967; Walter 2010; Zikmund et al. 2010). The process of analytical coding involved creating nodes reflective of the concepts in the data. Each time a new concept was identified a new code was created, to ensure coding was exhaustive (Walter 2010). The third stage of analysis was the creation of categories, where the data was revisited to examine the ways the codes can be linked in order to understand relationships and differences between responses (Green et al. 2007). This process was iterative and nodes were refined, grouped and reviewed during the coding process. The final stage in the analysis process was the identification of themes, which is more than a category or description and involves interpretation of the issue under investigation (Green et al. 2007).

In total, 542 references or comments were attributed to seven key concepts during the coding process, with some concepts further refined into sub (or child) nodes representing specific elements of the primary (or parent) node (Appendix II). Matrix coding queries were then used to identify patterns or variation in responses according to characteristic attributes, such as role, region and planning scheme in effect. The results of the qualitative analysis of the surveys were stored in a Survey database – open-ended responses and the closed responses were stored in an Excel database (Table 2.2). The node system is illustrated in Appendix II.

Limitations, errors and bias

There are potential biases in the survey data, with Council officers with an interest in biodiversity conservation more likely to take the time to complete the survey (*selection bias*). The results of the survey are also limited by the survey instrument itself and the limited number of respondents providing responses to open-ended questions. The survey was predominantly made up of standardised questions with respondents only able to provide comments in relation to specific questions. Consequently, the questions asked inherently affected the themes identified by respondents (Babbie 2013). Furthermore, only 29% (n = 10) of survey respondents answered the open-ended questions. Therefore, the views expressed in the comments do not reflect the views of all respondents, only those that provided additional comments. This does not mean the data is not useful. Rather it limits the conclusions that can be drawn and suggests that further research is required to explore whether the concepts identified from the survey responses are consistent with a broader range of views. The mixed-methods research strategy addressed these limitations by utilising other data sources to triangulate findings and reduce bias.

2.1.2 In-depth interviews with key experts

Purpose

In-depth interviews are like conversations and aim to explore the complexity of meanings and interpretations that cannot be examined using positivist methodologies or quantitative methods (Liamputtong & Ezzy 2005:56). Semi-structured interviews were conducted with a range of planning, legal and ecological experts in order to obtain an in-depth understanding of the breadth and diversity of views on the role of planning schemes in conserving biodiversity in Tasmania, how planning schemes integrate with State and Commonwealth regulation, which biodiversity values are relevant at the local scale and the effectiveness of current approaches. The interviews were structured around a series of questions starting with the interviewee's role in biodiversity regulation, followed by their views on the drivers of biodiversity decline, the effectiveness of current regulatory instruments, the effectiveness of current regulatory instruments in achieving biodiversity conservation, the role of land use planning, how biodiversity should be integrated into land use planning and key challenges for effective integration (Appendix IV). Interview questions were adapted depending upon role and expertise of the participant. The interviews did not strictly follow the questions and they were used as prompts only. A full copy of the interview questions is included in Appendix IV.

Participant selection

Key considerations in selecting participants for the in-depth interviews included the number of people to be interviewed, which people to interview and how to recruit them. Selection of participants for semi-structured interviews was 'information-oriented' on the basis of expectations about their information content to 'maximise the utility of the information from small samples' (Flyvberg 2011). As such, the selection process was purposive and representative, focusing on capturing depth of experience and expertise, as well as breadth of expertise across a range of experts and sectors. Participants included local government planners and NRM staff, other regulators and experts in planning, biodiversity and the law, from government, non-government organisations and private agencies. Potential participants were selected on the basis of their expertise, experience and role in land use planning, biodiversity regulation and conservation at the Commonwealth, State and/or Local government scales within Tasmania.

Potential participants were identified via survey results and professional networks, using publicly available contact details, such as the Tasmanian Government Directory. Participants were recruited via personal invitation using email or phone contact. Participants were provided with an information sheet and formal written consent was obtained prior to participation (Appendix III). Ethics approval was obtained prior to contact being made with potential participants (Ethics Ref: H0013835).

Data collection and manipulation

In total 33 interviews were conducted with 36 interviewees.[5] Interviewees were from a mix of local government (n = 19, 53%), state government (n = 8, 22%) and non-government (n = 9, 25%), with expertise in planning (n = 15, 42%), biodiversity (n = 10, 28%), NRM (n = 7, 19%) or regulation (n = 4, 11%). Each interview was recorded on an audio-recording device and transcribed in full by a professional transcription service (Elisha Pierre) or myself, with all transcriptions checked by myself. Transcribed interviews were exported to N-VIVO. No further manipulation was undertaken prior to data analysis.

Data analysis

While the volume of data was greater than for the surveys, the data analysis process was consistent with that utilised for the open-ended survey data, involving the use of N-VIVO and the four-step process of data immersion, coding, creating categories and identification of themes (Green et al. 2007). In total, 5, 381 references or comments were attributed to 11 key concepts during the coding process, with most concepts further refined into sub (or child) nodes representing specific elements of the primary (or parent) node (Appendix V). The results of the analysis of the in-depth interviews were stored in an interview database (Table 2.2). Matrix coding queries were then used to identify patterns or variation in responses according to characteristic attributes, such as role, region and planning scheme in effect. The results were then exported into IBM SPSS (Statistic 22) and Minitab (18) for descriptive frequencies and exploration of relationships between characteristic attributes and responses.

Limitations, errors and bias

A key weakness of in-depth interviews is the small sample size, with results limited to a subset of people (Walter 2010). Confounding this issue is the potential for bias in the selection of participants. These weaknesses were addressed by ensuring a diverse range of actors involved in land use planning and biodiversity were interviewed, including participants from rural and urban LGAs, government and non-government, policy and science, State and Local government, and direct and indirect roles. The use of a mixed-methods research strategy also addressed these limitations by utilising other data sources to triangulate findings and reduce bias.

Another limitation of in-depth-interviews is the rigor and validity of the interpretation or coding. Validity is whether you measure what you say you are measuring (Babbie 2013). Validity of coding therefore exists when the data corresponds to the code that it represents. Once initial coding was completed, I reviewed the nodes and checked the face validity of nodes and associated coding rules. This involved reviewing what was in each node, determining if it belonged in this node and if not reallocating it to existing node(s) or creating new node(s) (including child nodes). This process

[5] Three interviews included 2 participants in the same interview.

ensured coding created exclusive categories that minimised ambiguities (Walter 2010). The node system for the semi-structured interviews is illustrated in Appendix V.

2.1.3 Content analysis of statutory planning instruments across time and LGAs

Purpose

Content analysis is a research technique for the objective, systematic and quantitative description of content within texts (Berelson 1971). Content analysis of biodiversity provisions within all planning schemes in effect at the time of data analysis was undertaken to obtain a comprehensive understanding of how biodiversity was integrated into land use planning instruments. Content analysis of the SPPs within the Tasmanian Planning Scheme was also undertaken to enable comparison with interim schemes. The purpose of the content analysis was to: understand how biodiversity conservation was integrated into planning instruments procedurally and substantively; identify where biodiversity is excluded from consideration; examine the criteria for determining when biodiversity impacts are acceptable; evaluate the implications of the SPPs for biodiversity conservation; and, test the perceptions and views expressed in the survey and interviews.

Case selection

Case selection was comprehensive and representative in that the content of all interim planning schemes were analysed. Interim schemes were chosen as: (i) at the time of data analysis these were the schemes in effect; and, (ii) comparison of interim schemes was more meaningful than pre-interim schemes as they were all developed concurrently under the same model framework. The only exception was the Flinders Island Planning Scheme, as Flinders Island had not introduced an interim scheme. Accordingly, in the absence of an interim scheme, the Flinders Island Planning Scheme 1994 was included in the content analysis. The content of the SPPs within the Tasmanian Planning Scheme were also analysed as they contain the mandated biodiversity provisions all LGAs will be required to implement once the LPSs are finalised.

Data collection, manipulation and analysis

Data collection involved obtaining electronic copies of all relevant planning schemes from the State Government's central repository (iPlan) and considering them to be 'sources' in N-VIVO. Character data on interviewees was also imported as a classification sheet to enable analysis by attributes such as role, region, and expertise. No further data collection or manipulation was undertaken prior to analysis.

The planning schemes were then coded both explicitly and implicitly (Sproule 2010). Explicit coding was used initially to identify the visible, easily identifiable content in the text using key terms such as native vegetation; ecosystem; priority vegetation; biodiversity; vegetation communities; and, threatened species. Implicit coding was then undertaken using the same four-step process adopted for the surveys and interviews (section 2.1.1), where the underlying and implicit meaning within the text was examined in order to code the content into nodes, then categories and themes (Green et al. 2007; Sproule 2010). The thematic analysis, also referred to as conceptual analysis, involved identifying any occurrences of the concepts (explicit or implicit) with the intent of quantifying or tallying the presence of the concept in the planning scheme (Sproule 2010). The process was iterative, and in some instances also involved reflecting upon coding of the interview data to enable comparisons across datasets (Appendix VI). For example, thematic analysis of the content of planning schemes and the content of interviews was undertaken to identify concepts of biodiversity (Appendix VI). The output from the content analysis was a statutory instruments database (Table 2.2).The results of the content analysis were also exported into Excel as ordinal data and combined with demographic data for each planning scheme, as well as with the results of the spatial data analysis (section 2.1.4) to create a single integrated database (Table 2.2). This process of sampling the qualitative data and extrapolating it via enumeration, then combining it with other data sources, enabled analysis of the relationships between the planning scheme instruments, spatial data and demographic or character data (section 2.1.5).

Limitations, errors and bias

Limitations of content analysis include errors in coding and the reduction of complex concepts to rudimentary counts (Sproule 2010). To reduce errors in coding, the coding process for the content analysis involved validity checks following initial coding (Babbie 2013). The validity checks involved both reviewing the nodes and checking the face validity of nodes and associated coding rules against the content. As the interim schemes were developed on a regional basis, any variation in coding for interim schemes within the same region was also checked against the primary data source to ensure the variation was not a coding error. The risk of rudimentary analysis was addressed by adopting a mixed-methods research strategy, with the interviews, surveys and spatial data analysis all providing context to the content analysis of the planning schemes.

2.1.4 Spatial analysis of biodiversity data relative to planning scheme application

Purpose

Spatial analysis is a generic term for the manipulation of spatial data to improve understanding of the geographic phenomena that the data represents, involving questions about how data in various layers might relate to each other, and how they vary over space (Huisman & de By 2001). The purpose of the spatial data analysis undertaken as part of the Tasmanian case study was to improve understanding of the extent of biodiversity subject to consideration under the interim schemes, the extent of biodiversity excluded from consideration, variation across interim schemes, as well as between interim schemes and the statewide scheme. This analysis involved answering questions about the extent and percentage of mapped biodiversity surrogates according to: LGA; region; planning scheme zones; and, planning scheme codes[6].

Data selection and access

Mapped biodiversity surrogates chosen for the spatial data analysis were: TASVEG 3.0 (Department of Primary Industries Parks Water and Environment 2013a); Threatened Native Vegetation Communities (TNVC) 2014 (Department of Primary Industries Parks Water and Environment 2014); and, priority vegetation mapping derived from the Regional Ecosystem Model (REM) (Knight 2018) (Table 2.3). Other spatial datasets used for the analysis included: the Tasmanian Planning Scheme Zoning; Tasmanian Planning Scheme Overlay; and, Local Government Areas (Table 2.4). All data were accessed via the relevant data custodian. Data sharing agreements were signed.

TASVEG v 3.0 is a Tasmania-wide vegetation map comprising 156 mapping units captured at a nominal scale of 1:25,000 and produced by the Tasmanian Vegetation Monitoring and Mapping Program (TVMMP) (Department of Primary Industries Parks Water and Environment 2013b). The mapped extent of native vegetation communities derived from TASVEG 3.0 was used as a surrogate for biodiversity for the purposes of spatial analysis as there is the potential for any patch of native vegetation to contain biodiversity values identified in the planning schemes (section 4.1). This dataset was also chosen as it provides statewide coverage and is suitable for analysis at the scale of LGAs.

TNVC 2014 is a statewide mapping layer showing the indicative extent of the 39 communities listed under Schedule 3A of the NCA and also produced by the TVMMP. TNVC 2014 is derived from TASVEG 3.0 for all but four of the thirty-nine (Department of Primary Industries Parks Water and Environment 2015a). The extent of threatened native vegetation communities derived from TNVC 2014 is used as a surrogate for biodiversity for the purposes of analysis as threatened native vegetation was the most common concept of biodiversity identified in interim planning schemes (section 4.1). TNVC 2014 is also recognised as appropriate for analysis at the statewide or regional scale (Department of Primary Industries Parks Water and Environment 2013b, 2015a).

Priority vegetation mapping refers to mapping undertaken by Natural Resource Planning (NRP) Pty Ltd for all Tasmanian councils for the purposes of developing maps of priority vegetation areas as required under and defined in the SPPs(Knight 2018) (section 3.3.3). The mapping is derived from the REM, which was also developed by NRP Pty Ltd (Knight 2016). The REM integrates spatial data on the distribution of the major components of biodiversity and models key biodiversity attributes, utilising an extensive range of datasets from a range of sources and preferencing field verified data where available (Knight 2016). The priority vegetation map comprises those attributes from the REM

[6] Planning schemes in Tasmania are divided into zones and codes. Zones are the primary controls for the use or development of land and the planning scheme maps show how the land is zoned. Codes identify additional provisions which apply to more than one zone and cannot be described by zone boundaries. Overlays on the maps may be used to indicate the areas where codes apply (Tasmanian Planning Commission 2014, 2016b). The distinction between and role of zones and codes is discussed in section 3.3.2.

that accord with the priority vegetation categories identified in the SPPs (Table 2.4). The priority vegetation map therefore provides the best available spatial representation of the biodiversity surrogates adopted under the SPPs. The priority vegetation mapping also provides the best approximation of the potential extent of the statutory maps mandated under the SPPs (section 5.1.2).

Data preparation and analysis

To enable analysis of the extent and percentage of native vegetation within different LGAs, zones and overlays, TASVEG 3.0 was clipped to exclude non-native vegetation types[7] Polygon clipping refers to the process of taking a polygon layer and restricting spatial extent to the generalized outer boundary obtained from all selected polygons (Huisman & de By 2001).

The native vegetation dataset derived from TASVEG 3.0 and TNVC 2014 were both generalised by dissolving all polygon features into a single merged statewide polygon in order to reduce the complexity of the data for subsequent analysis. These data sets were then split by LGA and zone, and attributed according to LGA, region, scheme, zone, and extent. As the priority vegetation mapping polygons were already attributed by LGA, they were dissolved into LGAs rather than into a single statewide dataset. The priority vegetation map was also associated with attribute data, including LGA, region, scheme, zone, and extent. Using this attribute information, each of the mapped biodiversity surrogates were able to be quantified according to LGA, region, zone, and code by using Structured Query Language (SQL) (Huisman & de By 2001; Pitney & Bowes 2015).

Limitations, errors and bias

The reliability of the spatial data analysis is a function of data quality as well as data preparation (Huisman & de By 2001). The quality and reliability of the data relied upon for the spatial analysis is variable. While TASVEG 3.0, TNVC 2014 and the priority vegetation mapping are all fit-for-purpose for analysis at the scale of the LGA, these datasets are indicative only (sections 5.2.2 and 6.1.1). There are also biases in the data, with some areas benefiting from greater survey effort and field verification (section 6.1.1). Consequently, the spatial data analysis undertaken for the Tasmanian case study is indicative only and more reliable in some areas and for some biodiversity surrogates.

The process of clipping and dissolving polygons prior to analysis also created errors in the data. These errors were reduced by performing functions such as deleting duplicates and closing gaps between polygons (Huisman & de By 2001).

The spatial data were also limited by the data selected and the analyses performed. Analysis of the different biodiversity surrogates within the priority vegetation mapping, as well as analysis of other available datasets would have increased understanding of the location and extent of biodiversity. Other datasets of relevance include: Council vegetation data, which is available for all LGAs within

[7] Non-native vegetation types under the TASVEG classification system include modified land, where vegetation has been cleared and/r substantially modified by human activity (F codes), and other natural environments such as water, sand or mud and lichen (O codes) (Kitchener & Harris 2013).

Greater Hobart as well as Huon Valley and considered to be more reliable than TASVEG 3.0; individual species datasets and models within the REM; habitat mapping; and, conservation planning datasets. Analysis of biodiversity data relative to urban growth areas and verified with current imagery could also provide a more accurate assessment of the extent and significance of biodiversity at risk from development, but all have incomplete coverage.

2.1.5 Integrated statewide analysis

Purpose

The major output of the Tasmanian case study was an integrated database combining the results of the content analysis and spatial data analysis with characteristic and demographic data according to LGA (Table 2.2). The creation of a single database enabled analysis of the relationships between the variables using principle components analysis (PCA), cluster analysis, one-way analysis of variance (ANOVA) and chi-square (chi^2) test for independence. The purpose of this analysis was to identify variation in concepts of biodiversity identified in planning instruments and explain this variation in relation to: (i) the planning scheme provisions; (ii) the application of zones and codes; (iii) the extent of the mapped biodiversity; and, (iv) demographic characteristics. This integrated analysis also enabled the broader research questions of the effectiveness of planning schemes in achieving biodiversity conservation outcomes and the points of break down in the land use planning process in translating biodiversity objectives to substantive outcomes to be answered. The results of the integrated statewide analysis are incorporated throughout chapters 4-7.

Data preparation and analysis

Data preparation for the integrated database involved the spatial data analysis and content analysis. The results of the spatial data analysis and content analysis were imported into an excel spreadsheet and combined with demographic data from the Australian Bureau of Statistics (ABS). Given the large set of variables (671), PCA was used to explain variation between schemes using a smaller set of factors or components (Pallant 2013), which for the purposes of this research, was variation in conceptualisation of biodiversity. Kaiser's criterion was used to determine the number of factors or dimensions to retain (Pallant 2013). In this instance, the number of principle components retained was four, as these four explained 95.1% of the variation in biodiversity concepts within planning schemes (section 4.1). Cluster analysis was then undertaken to categorise or group planning schemes according by concepts of biodiversity.

One-way ANOVA tests were used to determine if these groups varied on continuous variables (Pallant 2013), including the extent of mapped biodiversity surrogates and demographic data such as growth rates, population and area. The chi-square test was used to test whether the relationships between the groups and other categorical attributes varied from random (Pallant 2013), including the presence/absence of planning scheme content and demographic data, such as region, rural/urban, zoning and growth categories. Correlation was used to determine the strength of linear relationship between continuous variables (Pallant 2013), including the extent of biodiversity values, population and the percentage of each LGA subject to biodiversity provisions.

Limitations, errors and bias

Correcting errors in the data was an iterative process involving examination of the results to identify any anomalies based on an in-depth knowledge of the data. Where anomalies, such as outlier results, were detected, the base data was reviewed for errors, where necessary spatial analysis or content analyses were corrected and the statistical tests rerun.

2.2 Kingborough case study

The Kingborough case study anchors the collective case study in the particular, providing an in-depth analysis of how biodiversity conservation was integrated into statutory planning within a specific LGA. This instrumental case study evaluated the effectiveness of biodiversity conservation actions at the local scale by investigating the extent of loss relative to gain, the role of offsets and the effectiveness of protection mechanisms imposed via planning permit conditions.

Kingborough is a LGA in southern Tasmania, located south of Hobart, has an area of 72,010 hectares and a population of 36,263 (section 8.1). This case was selected on the basis of the expectations around the information content, as Kingborough is one of Tasmania's fastest growing LGAs, the growth area intersects with biodiversity and the rules being applied are recognised as the strongest in Tasmania. This case study has also been chosen as I have a detailed knowledge of many of the sites through my role as Environmental Planner with Kingborough Council and access to data not readily available to researchers.[8] The Kingborough case study involved three components: an audit of biodiversity losses, gains and future risk; an audit of offsets; and, an audit of protection areas protected as a result of development approvals (Table 2.1). Each of these methods and their purpose is detailed hereafter.

2.2.1 Audit of biodiversity loss, gain and risk in the urban growth area

Purpose

Data on loss of biodiversity as a result of land use planning decisions is limited and consequently biodiversity loss and biodiversity gains from development regulated by the *Land Use Planning and*

[8] While this proximity to my case study has numerous potential benefits, I need to consider and address potential ethical issues associated with my proximity to the case. For example, what data is in the public arena, how do I access this data for research purposes, how do I maintain confidentiality where appropriate and how do I position myself and my experiences/perceptions/interpretations in relation to my research? Ethics committee approval, data agreements and non-disclosure of sensitive information are measures which have been implemented to address these issues.

Approvals Act 1993 (LUPAA) remain largely unaccounted for and largely unknown.[9] The audit of loss, gains and risk provides a comprehensive summary of native vegetation loss, gain and risk from 2000-2018 within the urban growth area (UGA) of Kingston/Blackmans Bay (Table 2.2).

Case selection

The audit was limited to the UGA as: (i) there was complete coverage and high-resolution satellite imagery for this area; (ii) the basis for and likelihood of loss was able to be reliably attributed to development regulated by LUPAA; and, (iii) 80% of native vegetation loss and 63% of individual tree removal subject to offsets over the period 2000-2018 occurred within the UGA.

Data collection, manipulation and analysis

Data sources for analysis of loss, gain and risk within the UGA were the TASVEG_Change_2005 dataset (Resource Management and Conservation 2006b), photo interpretation (PI) mapping of satellite imagery, and Council records on development applications. The data from development approvals and the MVEP were compared with satellite imagery from 2005-2015 to identify loss of native vegetation cover the UGA as identified in the Kingborough Land Use Strategy 2018 (Kingborough Council 2018). Native vegetation cover was used as a surrogate for biodiversity more broadly as it can be easily detected in satellite imagery and field verification has routinely identified native vegetation in the UGA as supporting a range of threatened species and threatened native vegetation communities. Mapped native vegetation cover comprised small remnant patches of native vegetation, including stands of trees, as well as more extensive areas of native vegetation. Individual tree loss was also included in the database, where this loss was subject to an offset.

Using these data, patches of native vegetation or canopy cover removed during the period 2000-2018 were identified and attributed with extent, zone, year of loss, type of loss, type of development, whether it was offset, the type of offset, the extent of offset and the regulations in effect at the time. Vegetation protected as an outcome of land use planning decisions was identified and attributed by protected status, development type, zone, offset type extent and regulations in effect. Vegetation cover identified as still remaining was attributed with extent, zone and level of risk based on a combination of zoning, tenure and protected status.

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[9] While the Forest Practices Authority (FPA) monitors changes in the extent of native forest cover under the Permanent Native Forest Estate (PNFE) Policy, this monitoring is limited to loss approved under a certified forest practices plan (section 3.2.2) (Tasmanian Government 2017a). Consequently, loss arising from land use planning decisions is not included in the PNFE monitoring. Monitoring of vegetation change has also been undertaken by the Monitoring Vegetation Extent Project (MVEP), resulting in the TASVEG_Change_2005 dataset. The MVEP compared satellite imagery across a five-year period to detect forest and non-forest vegetation cover changes. Where possible, these changes were verified using information from other sources such as Forest Practices Plans and high-resolution imagery (Webb 2008). The MVEP and resultant TASVEG_Change_2005 dataset allow vegetation change to be identified for different land tenures and land uses, and for forest and non-forest vegetation, providing a useful snap-shot of native vegetation cover loss in the period 2000-2005 (Webb 2008). However the data are limited in that they do not identify the type of activity or development creating the loss, it has only been undertaken for a single 5 year period, non-forest change is difficult to detect and cloud-cover masks some changes. The data are also not considered reliable at the local or site scale (Webb 2008).

Statistical tests were performed on both these databases, including one-way ANOVA and chi-square depending upon the type of data, to test the relationship between variables and establish whether there was a significant change in loss relative to gains over time and under different regulatory regimes.

In order to determine variation in loss relative to gain over time and under different regulatory regimes, I conducted a one-way ANOVA where the regulatory regime in effect was the factor and the extent of vegetation loss and extent of vegetation gain were the response variables. In order to determine whether there was a correlation between loss of particular values and regulatory regime in effect, I conducted a chi-squared analysis of the percentage of proposals involving loss of specified biodiversity values according to regulation in effect.

Limitations, errors and bias

The reliability of the loss, gain and risk analysis is a function of the accuracy of the PI mapping in differentiating non-native vegetation cover from native vegetation cover. While larger urban remnants are readily identifiable, determining when remnant vegetation becomes an urban garden with individual remnant trees is more difficult. Therefore, it is inevitable that some areas of remnant vegetation were excluded from analysis, and other areas more appropriately mapped as gardens, have been erroneously included. Individual trees are also excluded from spatial analysis of loss and risk. While valuable, PI mapping down to the scale of individual trees was impractical.

2.2.2 Audit of loss and gains subject to offsets

Purpose

To evaluate the contribution and effectiveness of offsets to biodiversity conservation at the local level, a database of all offsets within the Kingborough LGA for the period 2000-2018 was developed. The purpose of this database was twofold: (i) audit the extent of loss relative to gain across the LGA (sections 8.2 and 8.3); and, (ii) evaluate the effectiveness of these offsets in relation to the key offset principles of avoidance, additionality, equivalency, currency, location, timing and security (Brown et al. 2014; Gardner et al. 2013; Maron et al. 2016; Maron, Rhodes & Gibbons 2013; McKenney & Kiesecker 2010; Preston 2016; Webb 2009) (section 8.4). In order to explore the relationship between the use of offsets and regulatory regimes, I conducted chi-square analysis of the percentage of proposals using offsets and the offset mechanisms used relative to the regulations in effect. To evaluate the effectiveness of offsets I also conducted a chi-squared analysis of the percentage of proposals satisfying accepted offset principles of avoidance, additionality, equivalence, currency, location, timing and security.

Case selection

The audit of offsets was undertaken at the scale of the LGA to ensure it provided a comprehensive understanding of the extent and drivers of biodiversity loss and offset outcomes across the rural and urban landscape.

Data collection, manipulation and analysis

Data on each development proposal involving an offset was obtained from Council records on development approvals for the period 2000-2018 and entered into an Excel spreadsheet, creating a comprehensive offset database (Table 2.2). Attributes in the database were the extent and type of offset mechanism, locality, zone, type of development, extent and type of values impacted, and evaluation of compliance with offset principles (Table 2.2). For the purposes of the loss and gain analysis, statistical tests were performed on both these databases. One-way ANOVA and chi-square were used depending upon the type of data.

Using the database of offsets, an audit of offsets across the LGA was undertaken in relation to the key offset principles of avoidance, additionality, equivalency, currency, location, timing and security. Results were exported into SPSS and Mini-tab for descriptive frequencies to explore relationships between attributes and offset outcomes and chi-square to test whether the relationships between categorical variables varied from random.

Limitations, errors and bias

The process of collating data on development approvals involving offsets into a single offset database was manual, involving content analysis of consultants reports, Council officer reports, the financial offsets register and legal agreements securing offset sites. Therefore, the quality and level of detail varied between cases. This limited analysis to attributes which were able to be reliably and consistently identified across all development applications.

2.2.3 Audit of areas protected through the development approval process

Purpose

To evaluate the effectiveness of the development approval process in achieving biodiversity outcomes, an audit was undertaken of conservation areas protected via a legally binding agreement as a result of conditions of approval for development. The audit involved field based compliance and ecological monitoring across 32% (177 hectares) of the conservation areas. The purpose of the audit was to: (i) determine compliance with the terms of the agreement, including implementation of management prescriptions; (ii) monitor the current extent and quality of identified biodiversity values protected by the agreement; and, (iii) evaluate the effectiveness of these agreements in contributing to biodiversity conservation.

Case selection

To prioritise agreements and properties for monitoring, the following criteria were developed:

(i) maximum variation in the agreements and sites monitored to obtain information about the importance of various circumstances for case process and outcome;

(ii) sites with biodiversity values dependent upon the Kingborough area for their long-term persistence, including values largely confined in their total distribution to the municipal area or with most of their range within the municipal area;

(iii) the length of time Agreements had been in place, with priority given to agreements which had been in place for > 5 years as these are overdue for monitoring, and sites with Agreements established after 2010 excluded as they are considered to be too recent to warrant monitoring; and,

(iv) resource and time constraints.

Consistent with these criteria, the conservation areas monitored ranged in size from 0.09 hectares to 64 hectares, had an average size of 13 hectares and were located in a range of contexts from urban and agricultural landscapes to forested hills.

Data collection

A monitoring method was developed to measure compliance, ecological attributes and condition (see the following section on data manipulation and analysis and Appendix VII). The compliance measures were derived from the terms of the agreements and the ecological measures were derived from accepted assessment and monitoring methodologies in Tasmania including the Vegetation Condition Assessment (VCA) method (Michaels 2006), the Biophysical Naturalness method (Knight & Cullen 2010a), the Forest Conservation Fund Conservation Value Index (Eigenraam et al. 2006), the Department of Primary Industries, Parks, Water and Environment (DPIPWE) Technical Manual (Barker 2001), DPIPWE's Land Manager's Guide (Barnes & McCoull 2002), mature habitat method (Forest Practices Authority 2012), forty-spotted pardalote habitat plots (Bryant 2010) and the Habitat Hectares method (State of Victoria 2014).

With the exception of tree sampling, field data were collected from assessment zones. Determination of assessment zones was predominantly based on the VCA method (Michaels 2006), with:

(i) a zone being the spatial units within a site in which the ecological attributes are measured ;

(ii) the size of the assessment zone being 1ha (a 56m radius circle plot from a central point) or a number of 20 x 20m quadrats, except where distribution of trees is not uniform, where a 40 x 40m sample plot is used (State of Victoria 2014);

(iii) each zone located within a discrete area of native vegetation consisting of a single TASVEG vegetation community with an observed similar averaged condition across its extent;

(iv) the number of zones being relative to the size of the site, with a small change in condition warranting a separate assessment on a small site, whereas on a large site, it may be incorporated into an average score;

(v) a different assessment required where there is a one category difference in four or more of the assessed site components or two categories difference in any one of the assessed site components; and,

(vi) zones not necessarily needing to be contiguous .

For tree sampling, the number of plots within the assessment zone was determined by the size of the zone and the variation across it, with a minimum of 3 plots in any uniform section and 15-30 trees in each plot, unless one or two plots covered most of the site, in which case all trees were measured (Reid & Stephen 2001). For large uniform forests, the total area of all plots was 2% of the total forest area (Reid & Stephen 2001).

Data manipulation and analysis

A database of all compliance and ecological monitoring was developed. Compliance with the terms of each agreement monitored was determined using a multi-point scale derived from Brown et al. (2013a), who attribute a score of ‘0’ where no effort was apparent to meet the terms of the Agreement, a score of ‘1’ where some effort was made but it fell short of what was required, a score of ‘2’ where substantial effort had been made but the requirements still were unsatisfied and a score of ‘3’ where the requirements were demonstrably met (Table 2.2). Ecological condition was determined using the VCA method and extent of values protected was derived from point and polygon data collected in the field and extrapolated using PI (Figure 2.2).

Table 2.2 Compliance scale (Brown et al. 2013a:5)

Compliance scale	Description
0 – No compliance	No apparent attempt to achieve compliance with the stated condition
1 – High level of non-compliance	Minor or insignificant attempt made to achieve compliance
2 – Medium level of non-compliance	Significant effort apparent in meeting the condition, but falls short of full compliance
3 – Satisfactory compliance	Acceptable compliance that is within a practical margin of error and minor flexibility

Figure 2.2 Example of ecological monitoring results for one Part 5 Agreement site

2.2.4 Limitations, errors and bias

The Part 5 Reserve Estate audit was limited by observer error and bias. The use of accepted monitoring methods specific to the biodiversity surrogate being measured was one strategy to reduce observer error and bias. Testing these methods in the field with the supervisory team prior to data collection, and conducting early assessments with other suitably qualified people, also provided an opportunity to refine and calibrate data collection techniques and interpretation.

2.3 Declaration of interest

Methodological appropriateness requires the researcher to be explicit about their assumptions in relation to their area of research and how these assumptions are embedded within their interpretive framework (Creswell 2013; Denzin & Lincoln 2011). Irrespective of the methods chosen, the researcher brings certain beliefs and philosophical assumptions to their research (Creswell 2013; Dowling 2010; Hay 2010).

> The generation of a research hypothesis, the refining of the research question, the judgement of what might be important additions to knowledge… the choices and decisions made in research design, the selection of participants, and interpretation of data – all of these involve value claims (Given 2008:53).

As an environmental planner within a planning authority, I am undertaking this research whilst embedded in my area of research. This research is grounded in and emerges from my direct experience, unavoidably colouring my interpretation of the data. Notwithstanding, while my experience informs my research, it does not dictate the findings. The use of survey and semi-structured interviews provides me with a range of perspectives to test my preconceptions; the collection and analysis of quantitative data, including spatial data, content analysis and ecological data, provides empirical evidence to test these perceptions; and, my overarching iterative research strategy enables me to move back and forth between data, experience and wider concepts (Mason 2002:180-181).

2.4 Conclusion

In this chapter I positioned the research within qualitative and quantitative research traditions and detailed my mixed method multiple case study research design, including an overview of each case study and the respective methods, why I chose them, how I selected participants or cases, data collection, analysis and interpretation, and how I dealt with errors or bias.

As the research investigates the integration of biodiversity conservation at multiple scales, this research design enabled the use of different methods for different scales and types of analysis. Mixed-methods were also used to corroborate the findings using multiple data sources, testing planning instruments against perceptions against spatial data against ecological data. Finally, a mixed-methods research design also reflects the reality of environmental planning, which is multi-disciplinary and spans planning, policy, ecology, and spatial sciences.

The following chapter is the first of six substantive chapters and is concerned with the regulatory framework for biodiversity conservation and land use planning within Tasmania. Chapter 3 specifically maps the regulations and associated regulators and their respective roles governing biodiversity conservation, identifies how biodiversity conservation is integrated into land use planning, and investigates the integration of biodiversity conservation into planning schemes throughout the research process and across three phases of planning reform.

Chapter 3 - The regulatory context for biodiversity conservation in Tasmania

Within Australia's federalist system, environmental or land use planning is a State-based activity, with most responsibilities then delegated to local government (Bates 2013; Willey 2007). Therefore, the legislation, planning systems and the role of statutory planning schemes in addressing threats to biodiversity varies from State to State (Planning Institute of Australia 2012; Willey 2007). Queensland, Victoria and New South Wales all have long-established consistent regulatory frameworks linked to standardised minimum provisions established under the Queensland Planning Provisions (State of Queensland 2016), the Victorian Planning Provisions (State of Victoria 2018) and the State Environmental Planning Policies (State of New South Wales 2014) respectively.

In Tasmania standardised planning provisions are a recent development and are yet to come into effect. Furthermore, legislative requirements governing impacts on biodiversity are disconnected and vary depending upon the activities being undertaken, with forestry operations and broad scale clearance and conversion for agriculture regulated under the Forest Practices System (FPS) and other activities, including urban and peri-urban development, quarrying, mining and dam construction, regulated within the Resource Management and Planning System (RMPS). Regulation also occurs at the national level via the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA), and at the local level, under by-laws. Therefore, there is no coherent regulatory framework for biodiversity conservation in Tasmania, rather there is 'a plethora of instruments in a fragmented milieu characterised by great complexity' (Harris 2011).

In this chapter I: (i) chart the regulations, the associated players (regulators) and their respective roles governing biodiversity conservation within the broad categories of threatened species management and native vegetation management (section 3.1); (ii) identify how biodiversity conservation is integrated into land use planning under the RMPS and establish the importance of statutory planning schemes and the role of local government (section 3.2); and, (iii) investigate the integration of biodiversity conservation into planning schemes throughout the research process and across three phases of planning reform (section 3.3).[10]

3.1 The legislative framework

While there is no overarching framework, biodiversity regulation in Tasmania under the FPS and RMPS systems can be broadly categorised into management of native vegetation communities and management of threatened species (Southern Tasmanian Councils Authority 2013) (Figure 3.1).The protection of comprehensive, representative and adequate areas of native vegetation communities is considered to make an important contribution to biodiversity conservation through maintenance of: ecological processes and the dynamics of ecosystems; viable examples of ecosystems throughout their

[10] This chapter draws on the results of the survey of local government (section 2.1.1) and the semi-structured interviews (section 2.1.2).

natural ranges; viable populations of native species their natural ranges; and, the genetic diversity of native species (Commonwealth of Australia 1997).

Rare, vulnerable and endangered vegetation communities, or threatened native vegetation communities, are accepted as being the highest priority for the conservation of native vegetation communities, either through the reserve system or through other mechanisms (Commonwealth of Australia 1997). Native vegetation communities are considered to be threatened where they are naturally rare and limited in their distribution, they have been cleared to such an extent that there is very little left relative to 1750, the accepted benchmark date, and/or they are subject to continuing and significant threatening processes and are at risk of extinction (Australian Government 2013a; Commonwealth of Australia 1997).

Conserving threatened species is another well accepted objective of biodiversity conservation and is enshrined in legislation to varying degrees at the national, state and local levels. Similar to threatened vegetation communities, threatened species are classified according to their level of threat and risk of extinction. Depending upon which piece of legislation they are listed under, they may be classified as extinct, critically endangered, endangered, vulnerable or rare.

3.1.1 Threatened species management

The management of threatened species in Tasmania is predominantly overseen by the State Government through the *Threatened Species Protection Act 1995* (TSPA) and by the Commonwealth Government under the EPBCA (Figure 3.1). Over 600 species are listed as threatened under the Tasmanian TSPA (Department of Primary Industries Parks Water and Environment 2015b). Many, but not all, of these species are also listed as threatened under the EPBCA, although their status may differ. Other species are listed at the Commonwealth level but not the State.

The EPBCA

The EPBCA comes into effect when a proposed action has the potential to have a significant impact on a matter of national environmental significance, including listed threatened species and ecological communities (Australian Government 2013b). The objects of the EPBCA include promoting ecologically sustainable development (ESD) through the conservation and ecologically sustainable use of natural resources and promoting the conservation of biodiversity [s3(A)]. Criteria for determining whether an activity will have a significant impact on a threatened species listed under the EPBCA include consideration of habitat loss, not just direct impacts on the species (Australian Government 2013b).Under s136(2) of the EPBCA, in deciding whether or not to approve the taking of an action that may have a significant impact on a threatened species, the Minister must also take into account the principles of ESD. Therefore there is a procedural requirement, but not necessarily a substantive requirement, under the EPBCA to promote ESD and biodiversity conservation.

Whether an action has, will have, or is likely to have, a significant impact on EPBCA listed species or communities, and therefore requires approval from the Minister, relies upon a self-assessment process by the person undertaking the action (Australian Government 2013b). There are no requirements or mechanisms for other regulators to refer an action and there is no integration with State or local approval processes.[11]

> I think part of the problem of the Commonwealth [EPBCA] is the fact it is just a proponent based referral system (State Expert 4 2015).
>
> The EPBC Act, it's completely self-referral. And so that creates a weakness. I think if we didn't have a process at the Council level, then a lot of things would never be addressed (Ecological Consultant 2 2015).

Development of a one-stop-shop approval process to integrate the EPBCA into State legislation is in progress (Commonwealth of Australia 2014). However, the one-stop-shop as currently proposed only integrates select pieces of legislation and excludes legislation governing land use planning decisions. Therefore, it won't 'provide the kind of one-stop-shop or consistency that they're suggesting it will' (NGO Expert 1 2015).

The TSPA

The TSPA is administered by the Secretary of the Department of Primary Industries, Parks, Water and Environment (DPIPWE) (Environmental Defenders Office (Tas) 2014). In determining whether or not to issue a permit, under s4 of the TSPA, 'it is the obligation of any person on whom a function is imposed, or a power is conferred, under this Act to perform the function or to exercise the power in such a manner as to further the objectives specified in Schedule 1'. These Schedule 1 objectives are derived from, and consistent with, the objectives of the RMPS and include the *promotion* of ESD. [12] Consequently, the TSPA has a stronger substantive requirement than the EPBCA, as it not only has to take into account ESD, but promote it.

Schedule 2 of the TSPA specifies the objectives of the threatened species protection system in Tasmania more specifically. The first of these objectives are:

(a) to ensure that all native flora and fauna in Tasmania can survive, flourish and retain their potential for evolutionary development in the wild; and,
(b) to ensure that the genetic diversity of native flora and fauna is maintained.

These are quite ambitious objectives which, in order to be achieved, would require substantive outcomes for biodiversity, not merely procedural consideration. However, substantive biodiversity conservation outcomes are limited by the narrow application of the TSPA. While s23 of the TSPA provides a mechanism for the protection of threatened species habitat through declaring critical habitat, to date no such declarations have been made, in part due to compensation requirements (Environmental Defenders Office (Tas) 2014).

[11] The only exception is the exemptions for significant impacts on EPBCA listed species for forestry activities carried out in accordance with the Regional Forest Agreement [s6(4) of the Regional Forest Agreement Act 2002 (Cth)]. While treated as an exemption from the EPBCA, the RFA was intended to constitute a form of assessment and approval for the purposes of the EPBCA (Environmental Defenders Office (Tas) 2015).

[12] The objectives of the RMPS are discussed in further detail in section 3.2.

> There's also this concept of the critical habitat and that was obviously done really to allow for managing around habitat … but it's never worked and that means that it is not nearly as effective as it should be (State Expert 3 2015).

In the absence of identifying and declaring critical habitat, State threatened species legislation is not invoked unless there is a direct intention to knowingly 'take' a threatened species under s51 of the TSPA.[13] As one interviewee highlighted, this limitation of the TSPA to knowingly 'take' is problematic:

> You don't always know the species is there, and if you really want to push things you can just say, 'Well the species wasn't there when I did whatever it was'... it is frustrating because the objective of the TSPA actually is something about making sure that all native flora and fauna flourish' (State Expert 3 2015).

Indirect impacts on threatened species and protection of habitat for species listed only under State legislation therefore falls into the broader management of native vegetation communities (Southern Tasmanian Councils Authority 2013) (Figure 3.1). Some of these vegetation communities are listed as threatened under the *Nature Conservation Act 2002* (NCA) or endangered under the EPBCA. However, while the NCA identifies these threatened vegetation communities, unlike the EPBCA, the NCA simply lists what these communities are and does not provide a mechanism for protecting them.

> I think the threatened veg community issue is probably the same, but potentially even more exacerbated in terms of, when we are providing advice in terms of threatened species to the different regulators. At least in the *Threatened Species Act* there are some sorts of standards and offences that it sets out. And that allows us to have a standard that we can manage to or sometimes we can say, 'No you will need a permit here and you'll need to come to us', or if we are aware of an activity that a regulator has provided us which is clearly an offence under the act, so there are powers under that act; whereas … in the threatened veg space they are listed under the Nature Con Act, but then that's all it does, it lists them, it doesn't provide any offences. All the activities, all the sort of things you can and can't do within those communities are specified under the Forest Practices Regs which we don't actually enforce. So the Forest Practices Authority manages them for forestry alone. Those standards under the Forest Practices as I understand really only apply to forestry activities, and pretty much everything else, is variable (State Expert 4 2015).

Consequently, management of threatened species habitat and threatened native vegetation communities occurs principally through the EPBCA, the FPS or the RMPS, not via the seemingly relevant pieces of State legislation (Figure 3.1).

3.1.2 Native vegetation management

The FPS is the central mechanism for regulating clearance and conversion or disturbance of native vegetation in Tasmania through the *Forest Practices Act 1985* and the *Forest Practices Regulations*

[13] This is a very specific clause that requires the following three tests be satisfied: (i) the presence of the species; (ii) the knowledge of the presence of the species by the person or persons conducting the activity; and, (iii) a direct impact that will result in the death of that species.

2007 (Figure 3.1). Under the *Forest Practices Regulations*, a forest practices plan is required for the clearing of forest, or the clearance and conversion of a threatened native vegetation community, unless otherwise exempt. A forest practices plan is also required where threatened species or their habitats are present in forest proposed for clearing. However, unless listed as a threatened native vegetation community, the FPS does not regulate non-forest native vegetation communities.

The FPS is administered by the Forest Practices Authority (FPA) (s4AA of the *Forest Practices Act 1985*). Under s4B (2)(c) of the *Forest Practices Act 1985*, the FPA is to act in all matters in a manner that, amongst other things, takes into account social, economic and environmental outcomes of its decision-making processes. This clause establishes a procedural requirement for the FPA to take ESD into consideration. Furthermore, under s19 (1AA) of *the Forest Practices Act 1985*:

> the Authority is not to certify a forest practices plan involving the clearance and conversion of a threatened native vegetation community unless the Authority is satisfied of one or more of the following:
>
> (a) the clearance and conversion is justified by exceptional circumstances;
>
> (b) the activities authorised by the forest practices plan are likely to have an overall environmental benefit;
>
> (c) the clearance and conversion is unlikely to detract substantially from the conservation of the threatened native vegetation community;
>
> (d) the clearance and conversion is unlikely to detract substantially from the conservation values in the vicinity of the threatened native vegetation community.

As the FPA must be satisfied these requirements are met in certifying a forest practices plan, the FPS provides substantive requirements for biodiversity conservation.

The certification of forest practices plans must also be in accordance with the Forest Practices Code 2000, which requires that threatened species are managed in accordance with procedures and management prescriptions agreed between the FPA and the Secretary of the department responsible for administration of the TSPA (DPIPWE) (Forest Practices Authority 2014a; Forest Practices Board 2000; 2010). These agreed procedures establish the joint roles and responsibilities of the FPA and DPIPWE and establish how threatened species listed under the TSPA will be managed under the FPS. One of the outcomes of these agreed procedures is that activities carried out under a certified forest practices plan do not require a separate permit under the TSPA.

Another outcome of the agreed procedures is the protection of not just the species itself through the forest practices plan process, but also habitat for the species. This protection is achieved via the development and application of endorsed management prescriptions to protect threatened species (Forest Practices Authority 2014a). Where the endorsed management prescriptions require adaptation for a specific operational area, site-specific management prescriptions are determined by the FPA in consultation with DPIPWE (Forest Practices Authority 2014a). These procedures and accompanying management prescriptions aim to restrict the conversion of significant habitat to non-native vegetation cover where the conversion is assessed as having a long term and detrimental effect on the species and its habitat, unless there are exceptional circumstances (Forest Practices Authority 2008).

> The forestry stuff's really complicated …But I know … it has worked well because under whatever the legislation combination it is, we have these prescriptions which mean that you can actually do stuff like protect around habitat (State Expert 3 2015).

However the extent to which these management prescriptions are applied and therefore substantive biodiversity conservation outcomes can be achieved is limited by the duty of care provisions in the Forest Practices Code. Under these duty of care provisions, up to an additional 5% of the existing and proposed forest on the property may be totally excluded from forest operations for environmental and social values, or at a level of up to an additional 10% where partial harvesting of the reserve area is compatible with the protection of the values (Forest Practices Authority 2015). The rationale for this is that the conservation of values beyond the duty of care required under the Forest Practices Code is deemed to be for the broader community benefit and beyond what can reasonably be required of landowners, unless this conservation is voluntary and achieved via market-based instruments and incentives rather than regulation (Forest Practices Authority 2015).

These provisions effectively limit the extent of significant values that can be protected as part of a forest practices plan to a maximum of 10% of the plan area, irrespective of the extent or conservation status of the values unless compensation is paid. One interviewee highlighted an example of where this duty of care provision and refusal by the State Government to pay compensation resulted in a disastrous outcome for biodiversity, one which is totally at odds with the agreed procedures and management prescriptions for threatened native vegetation communities and threatened species.

> that block has extraordinary environmental values and if there is ever 1800 hectares of land that needs a covenant on it and active management to maintain those values, that's the block. We knocked it back because it had all those values... and the Minister's come back to us 12 months ago and said ‘We’re refusing the compensation and we are directing FPA to certify that plan with the minimum duty of care.’ So we’ve gone from having here’s all these planning tools assess these important values through to… the worst case scenario. And we have been told to clear it, to certify a plan to clear it with minimum protection, just to soil and water and 5% duty of care (State Expert 6 2015).

Other interviewees also highlighted the disjunct between the management prescriptions and the duty of care provisions compromising the ability of the FPS to achieve substantive biodiversity outcomes.

> It’s not working well now … the way the law works has changed. So, they don’t have to follow the prescriptions and … now they are simply following the letter of the law whereas, before it was sort of more in good faith that they really did follow them… they only absolutely have to follow the duty of care where they have to protect 5%.... it’s really ineffective (State Expert 3 2015).

> The position that the Forest Practices Authority's now taking is that anything above that is too much to ask for. And I think that's a real difficulty if you're setting the threshold at 5 or 10% when you know in some cases that's going to be plenty and in other cases that's not going to be enough (NGO Expert 1 2015).

While the FPS is the central mechanism for regulating clearance and conversion or disturbance of native vegetation in Tasmania and the FPA the principle regulator, there are also a number of exemptions to the *Forest Practices Regulations*. Section 4 of the Forest Practices Regulations specifies the circumstances in which a forest practices plan is and is not required.[14] These exemptions effectively delegate responsibility for assessing impacts on native vegetation specifically, and biodiversity more generally, to other regulations and regulators for specific activities or types of development (Figure 3.1).

Clearing associated with dam works are exempt under the *Forest Practices Regulations* where a dam permit has been issued under the *Water Management Act 1999* (WMA) (Figure 3.1). As with the TSPA, the WMA shares the objective of furthering the objectives of the RMPS, which include a substantive requirement to *promote* sustainable development and maintenance of ecological processes and genetic diversity.

The *Environmental Management and Pollution Control Act 1994* (EMPCA) also shares the objective of furthering the objectives of the RMPS and is the primary environment protection legislation in Tasmania. The EMPCA has a role to play in relation to vegetation removal and impacts on threatened species associated with Level 2 activities listed under Schedule 2 of EMPCA. Level 2 activities, which are regulated by the Environment Protection Authority (EPA), are those activities likely to have a significant environmental impact, such as wastewater treatment plants, wood processing facilities and large quarries (Environmental Defenders Office (Tas) 2014). Unlike clearing for dams under the WMA or clearing for development under the *Land Use Planning and Approvals Act 1993* (LUPAA), there is no exemption under the *Forest Practices Regulations* where a permit has been issued under EMPCA. Similarly, EMPCA does not exclude forestry. In recognition of this overlapping jurisdiction, the FPA and EPA have developed a formal memorandum of understanding, the objectives of which are:

(1) to define the respective roles of each statutory authority in relation to matters of potentially overlapping jurisdiction; and,
(2) to agree on how the parties will work together collaboratively to achieve the objectives of their respective legislation and minimise the potential for duplication of regulatory effort (Forest Practices Authority & Environment Protection Authority (EPA) Tasmania 2008).

[14] These exemptions from requiring a forest practices plan for the harvesting of timber or the clearing of trees on any land, or the clearance and conversion of a threatened native vegetation community on any land include: dam works authorised by a Division 3 permit issued under the *Water Management Act 1999* (d)(i); mineral exploration or mining activities that are authorised under a permit granted under the *Land Use Planning and Approvals Act 1993* or a lease or licence within the meaning of the *Mineral Resources Development Act 1995* (i)(i-iii); or, the construction of a building within the meaning of the *Land Use Planning and Approvals Act 1993* or of a group of such building or the carrying out of any associated development where authorised by a permit issued under that Act (j)(i-ii).

Until 2009, the FPS regulated clearing associated with urban and peri-urban development. In 2009 the *Forest Practices Regulations* were amended to explicitly exempt clearing associated with the construction of buildings and associated works including subdivision, where this development has been authorised in a permit issued under LUPAA (*Forest Practices Amendment Regulations* 2009 (S.R. 2009, No. 135)). This new exemption essentially confines the application of the *Forest Practices Regulations* to forest practices, which includes clearing associated with forestry operations, as well as broad scale clearance and conversion for agriculture, and implicitly places sole responsibility onto local government as planning authority, to regulate clearing associated with urban and peri-urban development through statutory planning schemes developed under LUPAA. Therefore the principal piece of legislation of relevance to this research is LUPAA and planning schemes are the principal statutory instrument governing the integration of biodiversity into land use planning.

Like the TSPA, WMA and EMPCA, LUPAA includes the same Schedule 1 objectives and therefore the same requirement to further sustainable development, including biodiversity conservation. These shared objectives reflect the fact that these pieces of legislation are all linked to and part of the RMPS. The FPS however, operates outside the RMPS and does not share the same objectives as legislation linked to the RMPS. In addition to incorporating the substantive Schedule 1 objectives of the RMPS, LUPAA also establishes the following objectives of the planning process in support of these shared objectives:

(a) to require sound strategic planning and co-ordinated action by State and local government; and,

(b) to establish a system of planning instruments to be the principal way of setting objectives, policies and controls for the use, development and protection of land; and,

(c) to ensure that the effects on the environment are considered and provide for explicit consideration of social and economic effects when decisions are made about the use and development of land; and,

(d) to require land use and development planning and policy to be easily integrated with environmental, social, economic, conservation and resource management policies at State, regional and municipal levels; and,

(e) to provide for the consolidation of approvals for land use or development and related matters, and to co-ordinate planning approvals with related approvals; and,

(f) to promote the health and wellbeing of all Tasmanians and visitors to Tasmania by ensuring a pleasant, efficient and safe environment for working, living and recreation; and,

(g) to conserve those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value; and,

(h) to protect public infrastructure and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community; and,

(i) to provide a planning framework which fully considers land capability.

These Part 2 objectives, notably (c) and (d), reinforce the equal importance of the environment in decision making, alongside economic and social considerations.

3.2 Integrating biodiversity conservation into land use planning - the role of the RMPS

In theory, the RMPS establishes an integrated approach to use and development of land and natural resources in Tasmania (Environmental Defenders Office (Tas) 2014). The RMPS comprises a suite of State policies, legislation, strategies, statutory planning instruments and procedures linked by common objectives which seek to further sustainable development (Environmental Defenders Office (Tas) 2014). Specifically, the objectives of the resource management and planning system of Tasmania are:

(a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity; and,

(b) to provide for the fair, orderly and sustainable use and development of air, land and water; and,

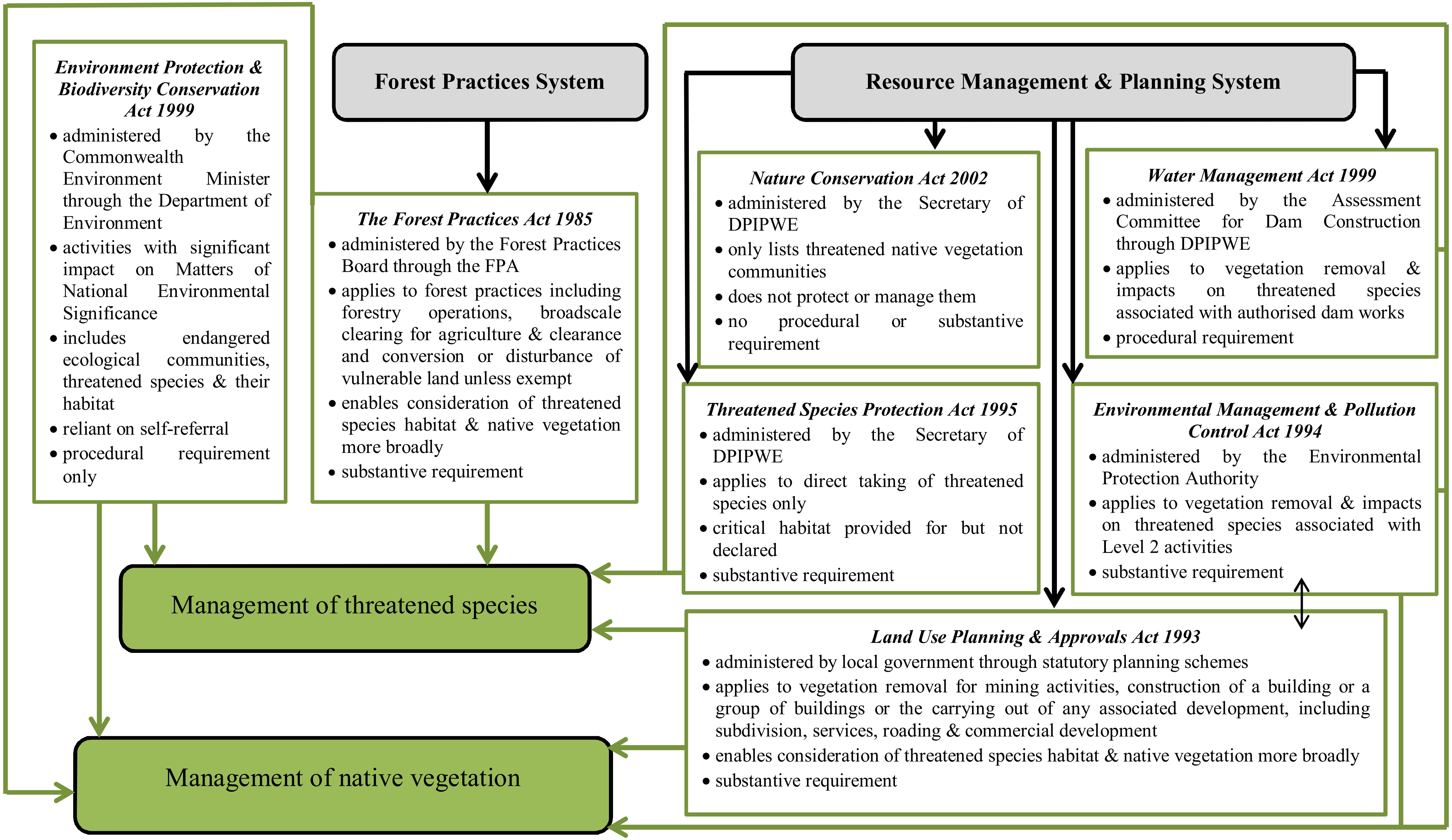
(c) to encourage public involvement in resource management and planning; and,

(d) to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c); and,

(e) to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State (Schedule 1 of LUPAA).

Therefore, at the heart of the RMPS is promoting and furthering sustainable development, and as an integral part of ESD, conserving biodiversity. The RMPS aims to achieve these objectives via a number of pieces of legislation and their associated instruments. The core piece of legislation under the RMPS governing land use planning in Tasmania is LUPAA (Figure 3.2). LUPAA establishes the planning process in Tasmania, including the: development of regional land use strategies; development, implementation and enforcement of planning schemes; and, the roles and functions of the Minister, the Tasmanian Planning Commission (TPC) and Councils as statutory planning authorities (Tasmanian Planning Commission 2017f).

Figure 3.1 Regulation of biodiversity in Tasmania



The extent to which land use planning furthers biodiversity conservation is therefore a direct function of the way in which it is integrated into land use strategies and statutory planning instruments. There are also other pieces of legislation which share the same objectives of sustainable development (section 3.1 and Figure 3.2). Of particular relevance to biodiversity conservation and land use planning are the *Threatened Species Protection Act 1995*, the *Nature Conservation Act 2002* and the *Water Management Act 1999*. The other principle legislation under the RMPS includes EMPCA, the *State Policies and Projects Act 1993*, the *Tasmanian Planning Commission Act 1997* and the *Resource Management and Planning Appeal Tribunal Act 1993* (RMPAT) (Figure 3.2).

3.2.1 When a system is not a system

According to Clark (1998), the architects of the RMPS recognised that integration of development and the environment was fundamental to achieving sustainable outcomes and they sought to achieve such integration by enshrining specific objectives and policies in legislation. Clark (1998:210) goes on to assert, the 'enshrining of these principles in legislation is the System's fundamental strength, for it imposes a mandatory requirement on all the System's decision-making bodies to promote those principles.' The approval processes under LUPAA and EMPCA were also designed to create a combined planning and environmental approval through the integration and streamlining of the provisions within these two Acts.

The introduction of this integrated framework in the form of the RMPS, with LUPAA centre stage, set high expectations for good decision making generally and furthering the objectives, including biodiversity conservation, specifically.

> I can remember the 1990s when people... took advantage of what was an incredible suite of new pieces of legislation. It gave people that had, and people without any resources, but particularly if you had some resources and knowledge, great access to the decision making process. It was a decision making process that was very powerful for average Tasmanians (NGO Expert 3 2015).

> The RMPS was set up in the '90s – everyone just assumed that was the standard to expect to at least try, and the objectives would be upheld (State Expert 5 2015).

> The RMPS objectives … mandate planning schemes deal with things of high conservation. … I mean it's pretty clear the schedule of LUPPA and the RMPS. I don't think that you can avoid it (Manager Planning 5 2015).

> The definition of sustainable development is enshrined in the… RMPS and picked up in a whole bunch of legislation is to protect the life giving supporting properties of air, land and water and community involvement, and to promote the interest of community. And if those three things can be achieved, then it's to facilitate economic development. Not to facilitate economic development at the expense of the full set; very much the other way around (Statutory Planner 7 2015).

While purporting to be integrated, the only formal links between the different pieces of legislation under the RMPS are the referral requirements under s25 of EMPCA, which requires a planning authority to refer permit applications for Level 2 activities listed in Schedule 2 to the EPA Board. The

Level 2 referral process is an integrated decision-making process involving assessment by both the EPA Board and the planning authority, with the EPA either:

(i) notifying the Planning Authority of any conditions which the EPA Board requires to be contained in a permit granted by the Authority under LUPAA and the reasons for requiring the condition; or

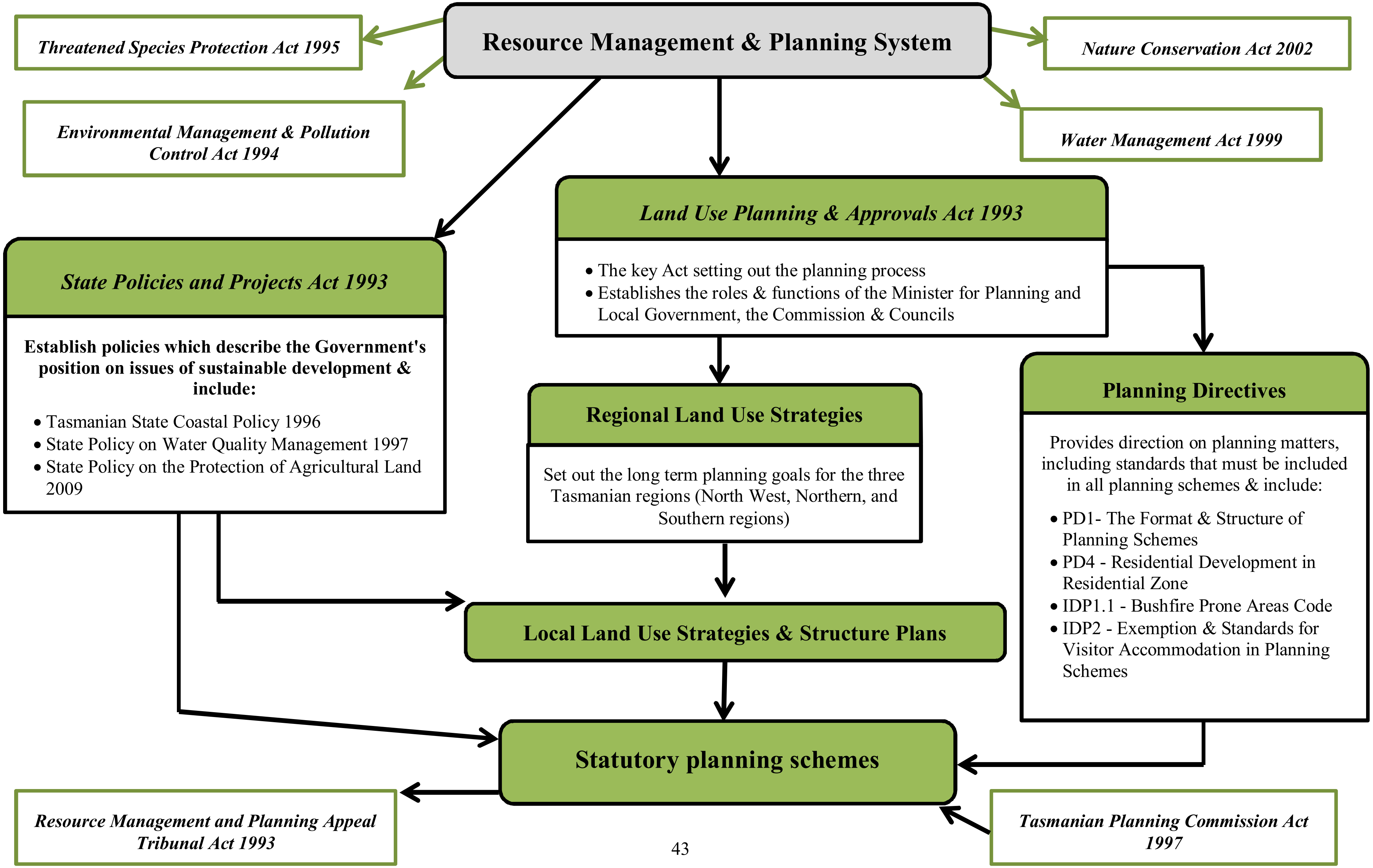
(ii) directing the Planning Authority to refuse to grant the permit and provide the reasons for giving the direction (2015).

Under s25 (2) of EMPCA, where an application is referred to the EPA Board, a planning authority is not required to assess any matter addressed in the EPA Board's assessment. Furthermore, if the planning authority elects to undertake their own assessment of matters addressed by the EPA Board, they must meet the costs of such an assessment and must not include any conditions on the permit which are inconsistent with or extend the operation of any conditions which the EPA Board imposes (2015). Consequently, where a Level 2 activity impacts upon State listed native vegetation communities or threatened species, these issues are generally assessed by the EPA rather than the planning authority.

With the exception of Level 2 referral requirements, there are no formal links between the different pieces of legislation under the RMPS, beyond sharing the same Schedule 1 Objectives. Therefore, there is limited integration between LUPAA and other legislation within the RMPS, or between the RMPS and the FPS.

> And the RMPS only has those two motherhood statements… and that's it, that's the only time it talks about it, and that's the end of that, and it's not very supportive of the *Nature Conservation Act* or the [*Threatened Species*] *Act*, and they don't work well together at all, but they just don't recognize each other properly (NRM 4 2015).

Figure 3.2 Land use planning in Tasmania - the RMPS, LUPAA and Planning Schemes



3.2.2 Biodiversity conservation in a policy vacuum

Central to realising the objectives of the RMPS was the development of a suite of State policies (Clark 1998). These State policies, established under the *State Policies and Projects Act 1993*, articulate the State Government's position on issues of sustainable development (Tasmanian Planning Commission 2017d). However, since the introduction of the RMPS, only three State policies have been developed to guide land use planning. These State policies relate to coasts, water quality and protection of agricultural land. There is no State policy explicitly relating to biodiversity conservation and how it should be integrated into land use planning. The lack of a clear policy framework for biodiversity conservation was identified as a key limitation of the RMPS by 19% (*n* = 7) of interviewees.

> The grand scheme in those days was every State entity and body that had an interest in a land use planning outcome would declare that interest, articulate it in a State policy and set out in that policy the outcomes required and the means by which to arrive at those outcomes. No State agency has done that; hence we only have PAL [State Policy on the Protection of Agricultural Land] for what it is worth, the State Coastal Policy for what you can get out of it, which is a heck of a lot or nothing depending on how you want to use it, and the State Water Quality policy which is fine up to a point except it's not supported by the empirical information which is necessary in order to give effect to a lot of those provisions (Manager Planning 4 2015).

The lack of a State policy was predominantly identified as an issue by interviewees from the planning profession (*n* = 5, 71%), including local government strategic and statutory planners, State Government planners and consultant planners.

> I think from what I understand they're grappling with the same issue as what the region was, the lack of clarity about what planning should be doing exactly in that space, exactly how important it is compared to other issues. The lack of State policies on it (Statutory Planner 3 2015).

> Well if the State would actually stump up and say what their policy position is, everything would be a lot easier (Statutory Planner 1 2015).

> I think that before the State starts to write one sentence of the statewide planning scheme, they need to come up with a whole lot of policy statements that their Minister or even cabinet signs off on to inform what the new scheme will do. And the first thing a policy statement on any issue has to do is say, 'Yes, this is an issue the planning schemes will tackle'. And then once that says yes, then the next policy statement needs to say, in sort of broad, plain English terms, what the schemes are going to do about it. Because unless those two questions are answered right at the start, then people would be arguing, debating them all the way through. And we just completely cloud the whole issue of what is the writing of the scheme (Manager Planning 1 2015).

The remaining interviewees expressing concern about the biodiversity policy vacuum (*n* = 2, 29%) were independent experts from non-government organisations (NGOs) who are directly involved in the statutory planning process.

> The difficulty is there is no State policy around these things. If there was a State policy around biodiversity, obviously the schemes and the development or amendment of schemes would be consistent with that and you'd be forced to have regard to those things. And the Commission when signing off on things, or the Minister depending on what kind of scheme it is, would have to have regard to those things in a way they're not strictly required to now cause there's no State policy that formally sets the criteria for what they have to have regard to (NGO Expert 1 2015).
>
> Right over the top of the development and planning approval processes there needs to be objectives for what the State of Tasmania wants for biodiversity (NGO Expert 3 2015).

No state biodiversity experts, local government environmental planning or natural resource management (NRM) staff, or independent ecological consultants raised the lack of State policy as an issue. One possible interpretation is that those with greater technical expertise in biodiversity conservation assume the relevance of biodiversity conservation in land use planning without needing a policy framework to validate it. Whereas, those interviewees with a direct role in statutory planning are looking for explicit policy signals to establish whether strategic and statutory planning should play a direct role in biodiversity conservation, rather than simply relying upon high level objectives embedded in parent legislation.

The State Government has indicated it will address the current policy gap via the development of what are referred to as small ‘p’ policies known as Tasmanian Planning Policies (Planning Policy Unit 2017). The intention is that these policies will be established under the draft *Land Use Planning and Approvals Amendment (Tasmanian Planning Policies) Bill 2017*. This is a new legislative mechanism made under LUPAA rather than the *State Policies and Projects Act 1993* and is specifically intended to provide strategic direction to assist the State and local governments in undertaking land use planning in relation to matters of State interest and will inform a range of planning instruments (Tasmanian Government 2017b). According to the consultation draft suite of policies, land use planning should provide for the protection and conservation of natural values whilst supporting ESD. One of the objectives of this policy is to ‘to maintain and enhance biodiversity by avoiding or minimising adverse impacts on listed Threatened Species, listed Threatened Native Vegetation Communities and other natural assets’ (Tasmanian Government 2017b:19-20). The draft small ‘p’ policy then further reinforces the objectives of ESD and biodiversity conservation as relevant considerations in land use planning. The draft policy also offers a high level strategy of avoiding and minimising impacts from land use and development on natural values. However it fails to require biodiversity conservation outcomes or establish any mechanisms for achievement.

In contrast to the RMPS, the FPS operates within the policy framework of the Permanent Native Forest Estate (PNFE) Policy. The primary purpose of the PNFE Policy is to regulate the extent to which native forests can be cleared and converted to other land uses (Tasmanian Government 2017a). This Policy is given effect through the FPA’s consideration of applications for forest practices plans under the *Forest Practices Act 1985* (Tasmanian Government 2017a). As conversion of native forests for development regulated by LUPAA is exempt from needing a forest practices plan, the PNFE

Policy does not apply. There is no mention in the PNFE Policy on the role of LUPAA in regulating the removal of native vegetation, including threatened native vegetation communities. Rather there is an exemption from the Policy where, amongst other things, a planning schemes has zoned land Rural, Rural Resource, Agricultural or Significant Agricultural (Tasmanian Government 2017a). Therefore, while the Policy intent is to regulate, maintain and monitor the clearance and conversion of native forests, it does not count clearance and conversion where it is a result of land use planning decisions or where a planning instrument zones the land for a particular purpose.

> There's only the Permanent Native Forest Estate Policy and that doesn't apply in the planning system or the LUPAA system' (Statutory Planner 3 2015).

> So there's a Permanent Native Forest Estate Policy that exists out there, that's applied through forest practices that isn't applied through land use planning, that says we shouldn't have any more clearing of threatened native vegetation communities (State Expert 7 2015).

> It's a mess. I don't think that the policy setting is clear enough, and what we've ended up with is this kind of ad hoc approach, because we haven't got the policy setting right. We've got-obviously the policy on the native forest estate, you'll know the name better than me off the top of your head (Consultant Planner 1 2015).

Therefore, while the FPS is intended to be the system for managing clearance and conversion of native vegetation to other land uses and operates within the framework of the PNFE Policy, the FPS and PNFE policy exclude land uses other than forest operations and clearance for agriculture. Conversely, the RMPS is intended to provide an integrated framework for land use planning, but is currently operating within a policy vacuum and is disconnected from the FPS.

3.2.3 Inconsistency reigns supreme

In the absence of a policy framework and explicit Government position on the relevance of land use planning in biodiversity conservation, there remains inconsistency in integration between and within regulators. Over 90% (n = 33) of interviewees made statements relating to inconsistency and poor integration between regulators and regulations, highlighting this as a major issue for furthering biodiversity conservation through land use planning:

> The fact is that it is not really clear as to… what's managed under the RMPS and what's managed under the Forest Practices System. And so yeah I think at the top, because of that lack of holistic direction, we've ended up with this ad hoc kind of approach that … has meant that by the time it gets down to local government it's even more fragmented and ad hoc. And you're trying to get local policy driving things that are actually probably more effectively dealt with at a higher level (Consultant Planner 1 2015).

> I think certainly the main problem is the lack of integration of the planning system and the forest practices system. I think that continues to create difficulties around strategic land use planning at a statewide level (NGO Expert 1 2015).

> I don't think the State legislation works very well. It might from their end, but the trigger points for assessment are hard to ascertain... And I can't see why they're different between local and the State (Statutory Planner 3 2015).

> I have seen quite a degree of inconsistency between how the local Council would deal with the matter versus how the State Government would deal with the matter (Consultant Planner 2 2015).

> I feel that the law is very messy because depending, on your activity and the particular regulator being conversed with, you may have to do a whole lot of different things for a particular species. That's always a slight problem and you talk to different experts' blah, blah, and blah and nobody is quite sure, but that's nothing to do what this is about; it's just regulators having completely different approaches (State Expert 3 2015).

Comments on inconsistency and fragmentation between regulators were made by interviewees across all areas of expertise (planning, biodiversity NRM and regulation), by those within State and local government, as well as those outside of government and irrespective of whether the interviewee's role was a direct statutory role, a direct role in biodiversity regulation or an indirect role in biodiversity regulation.

One of the implications of inconsistency between regulators is that there are different rules around how biodiversity should be considered depending upon what the activity is, which can result in different outcomes for the same values.

> In terms of State regulators … the EPA [are] quite good in that there's a clear process as to when they approach us for advice and how they use that advice …The other State regulators can be quite different. I mean the Forest Practices guys pretty much have their own system, they've built in threatened species to a certain extent… same with the dams, they have their own sort of system so; in that regard it can be quite varied. In the Council planning space I suppose it's a bit more like well our understanding is that the Council is the one who manages the planning permit and they're kind of empowered, if you will, to issue planning permits to allow for land clearance activities, so it's their decision they're the regulator… That's where you can get some very different outcomes in regards to – sometimes the same threatened species (State Expert 4 2015).

The following examples illustrate how there can be very different outcomes for the same site depending upon the regulator:

> We've had some shockers. We had one down at Carlton River where a guy made an application to selectively log 320 hectares of land. … it was threatened native vegetation, it had two eagles nests on it and was the flight path for the swift parrot, it was probably the best patch of swift parrot habitat in the state, it was a phenomenal blue gum forest…

> We knocked it back because it had inadequate protection for the wedge-tailed eagle and we thought the harvesting intensity was too much for the swift parrot and would have preferred a staged thing and regeneration and all the rest.

> He appealed that at the Tribunal, the Tribunal upheld our decision. The file, you had to get a trolley to get it down to the Tribunal. He then went to … Council, put in an application for a

> subdivision and he has got a 40 lot subdivision on that land and he's going for it (State Expert 6 2015).
>
> I did an audit … near Port Sorell and when I got there, there was a guy clearing the road works that didn't look anything like forestry. When I spoke to the person, he said 'I'm here under the instructions of the land owner to make a 20 lot subdivision' and it was a 20 hectare block. … Where the road ended was a site where the FPO [Forest Practices Officer] had found a rare orchid and we'd provided some advice on the protection of that orchid. Eight of the 20 hectares was *[Eucalyptus] ovata* forest and there was a landscape protection zone under the forest practices plan. So you are talking about one system, the forest practices planning system that talks about due care and reasonable protection for the environment and under that process had led to the protection and registering of a threatened plant species and the buffering of that area, 8 of the 20 hectares being excluded from harvesting and the other 12 hectares being allowed to be cleared because it was non-threatened native vegetation, through to a system that stamped 20 hectares of clearing … that was a real affront to the process. We got advice from the solicitor general's office and they said 'Well they've got a terrific case of defence here because they have got a valid permit that says they can do that' (State Expert 6 2015).

These examples illustrate not just the different outcomes under different regulatory systems, but also the way in which the regulations can be played off against each other. 'I think … the lack of integration between those two systems absolutely allows for that kind of gaming' (NGO Expert 1 2015).

The importance of consistency between regulators was evident in the survey results, with almost 80% of all respondents of the view that consistency in how Councils as planning authorities and other regulators assess impacts on biodiversity is desirable (Figure 3.3). In the words of one survey respondent:

> This is a matter for which there is no need to be different - consistency is … essential to defuse the antagonism that frequently exists between compliance agencies and the minds of developers and landowners, who find it difficult to connect with the appropriate agency and to understand why there is such a fragmented and disjointed approach to matters that could and should be relatively straightforward (Survey Respondent).

Almost 15% (n = 5) of survey respondents were undecided on whether consistency was desirable and only one respondent did not agree with this statement. When examining the results by the involvement of the survey respondent in the assessment of impacts of use or development on biodiversity, over 90% (n = 32) of those involved directly in assessing impacts on biodiversity agreed that consistency was desirable. In contrast, there was slightly less support for consistency amongst those with an informal role. When viewed by region, views on the desirability of consistency were generally similar. However when viewed by role within Council, fewer statutory planners or NRM officers were supportive of consistency between regulators relative to those with a direct role in assessing impacts on biodiversity.

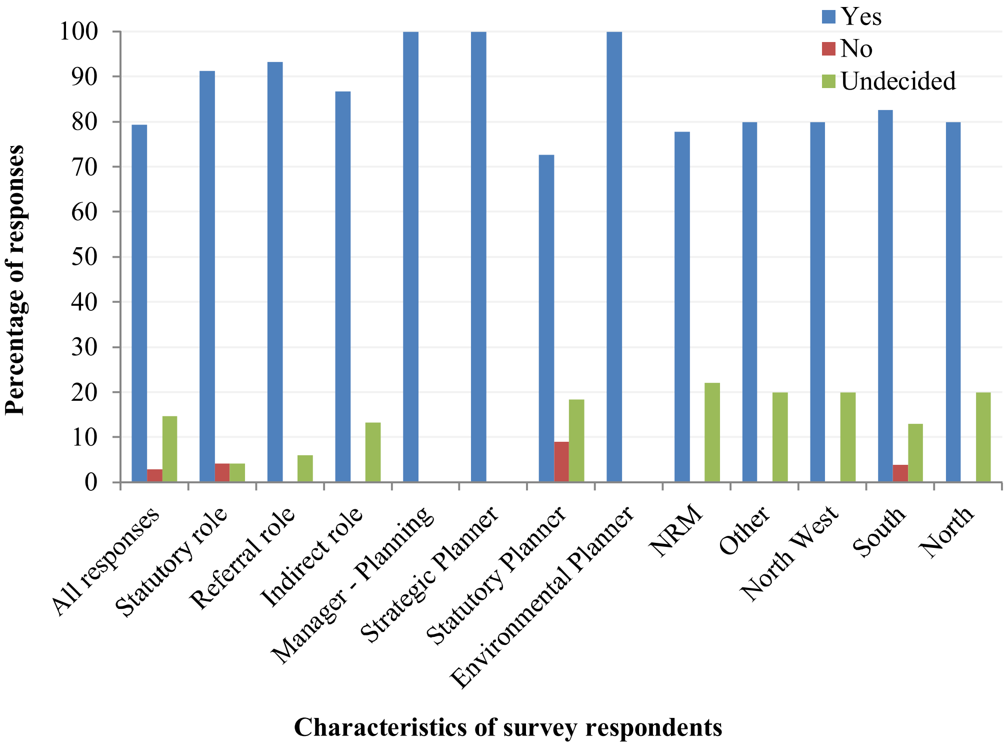


Figure 3.3 Survey responses from 34 local government officers with a role in land use planning, biodiversity regulation and/or natural resource management (NRM) to the question:

Is consistency in how Councils and other regulators assess impacts on biodiversity desirable?

Source: Survey of all Tasmanian Councils conducted in April 2014 as part of this research.

In addition to showing strong support for consistency across regulators, survey respondents highlighted that consistency was currently lacking.

> I think one of the key issues is the lack of consistency in the application of biodiversity conservation through planning schemes across the state. I think this is largely due to the lack of State Government leadership in relation to this issue. Policy advice is lacking and while technical advice available at the officer level, the issue needs to be elevated and championed from a higher level by the State (Survey Respondent).

Similarly, over half of all interviewees (n = 20) recognised the need for greater consistency between regulators.

> It is indisputable that we should all do the same thing… I think the fact that we've got all these different regulators is awful for everyone because it means it's really inconsistent, the proponent wastes lots of time and money and it's not likely to work well; it's quite upsetting. I think they should be consistent and coordinated at all the levels of regulation. The thing that the species needs should be managed in the same way and it should allow for a bit of precaution and a lot of precaution if you have no idea, but that's fairly difficult to manage (State Expert 3 2015).

> There should be consistency around the way biodiversity is managed and how the values are assessed, and who assesses them and what the criteria are for when it's considered, what loss is considered appropriate. Because yeah, it shouldn't matter what the development is on the site, if the issue is the protection of biodiversity values, then there shouldn't be different criteria

> depending on whether you're going to build a swimming pool or build a plantation. The loss of biodiversity is the same, it should be assessed in the same way (NGO Expert 1 2015).

Again these comments were made by interviewees across all areas of expertise (planning, biodiversity and NRM), by those within State and local government as well as those outside of government and irrespective of whether the interviewee's role was a direct statutory role, a direct role in biodiversity regulation or an indirect role in biodiversity regulation. However, it was predominantly interviewees working at the local government scale for smaller Councils in the North and South who qualified the need for consistency with the view that there needs to be the capacity for a level of local variation between regulators. This qualification to the need for consistency with the ability to have local variation was also acknowledged by survey respondents.

> If local government does have a role then there needs to be consistency with adhering to State and federal legislation, policy and advice. However, local government also is in a strong position to respond to the community and represent the wishes of the community. Therefore land use planning should be also to respond to the communities values (Survey Respondent).

> I think in a Council situation, a hectare and a hundred tons is a huge amount of clearing …That idea that someone might go to a bush block and knock down 15 or 20 blue gum trees, it's probably not a bad idea that they do have to get some approval for that in a Council situation (State Expert 6 2015).

Inherent in these views is an acknowledgement that the scale at which land use planning operates may necessitate consideration of values at lower thresholds than other regulators. These views also highlight the role of land use planning in protecting values which may be of importance to local communities, but are not necessarily of statewide significance or warranting consideration by State regulators. Irrespective of the rationale for local variation, it is evident that if such variation is recognised and provided for, this should not be at the expense of maintaining an integrated and coordinated approach across regulators.

> In terms of legislation, I think … we shouldn't contradict each other, but if local government areas want to have stronger provisions around the coast or around water use, then as long as that reflects the community views and Council are happy with that, they should be able to do that (NRM 2 2015).

The need for improved integration and coordination was another theme identified by 19% (n = 7) interviewees across all areas of expertise (planning, biodiversity NRM and regulation), by those within State and local government as well as those outside of government. The two key mechanisms for achieving better integration and coordination identified by interviewees were formal referral processes (n = 29, 85%) and local government as gatekeeper for other regulations under the RMPS (n = 8, 22%).

> It just makes sense that we should be more coordinated. I mean there is an effort to coordinate the Fed approach to threatened species with the State one, and so completely logically we should be doing that at that level (State Expert 3 2015).

> The objective should be the same because all the environmental legislation in the state by and large that the different regulators operate within is… the Resource Management and Planning System, which has its own objectives … things like threatened species for instance, the intent is they should be approaching the group that regulates that Act, which is us, and getting consistent advice into their planning permits so that they're all actually managing to the same standard (State Expert 4 2015).

> I think that would be best. If like the State could say, 'Here are our State values that we're going to protect, but we want local Councils to be the gatekeeper', so if there is an application and there are suspected to be State values impacted, then the system should just be like the heritage system where there's a referral to State authority to look at that and make a decision and then comes back to the Council, I think that would be best (Manager Planning 1 2015).

The role of local government as a gatekeeper and the need for formal referral processes that link land use planning with administrators of the primary pieces of biodiversity regulation was also identified by survey respondents.

> There needs to be a statutory link and adequate process to engage the land use permit processes with the bioconservation [sic] agency in the same manner as applies for a Level 2 activity under EMPCA, State Heritage register sites under HCHA [*Historic Cultural Heritage Act 1995*], and for water and sewerage issues under WSIA [*Water and Sewer Industry Act 2008*] (Survey Respondent).

At present there are no referral provisions within LUPAA, which is a key limitation to achieving integration:

> We can't in a formal sense refer a permit application and say to the Nature Conservation branch or heritage branch or whoever, we want advice on this because there's no mechanism under LUPPA to do that because there is no enabling provision in LUPPA to make a referral to a third party agency. You can't create that in the scheme. So we've had to sort of cunningly say we need the advice of that agency as an information requirement not as a referral requirement (Manager Planning 4 2015).

3.2.4 The buck stops where..?

Also central to achieving better integration and coordination across regulators is clarification around the roles of the different regulators. While LUPAA clearly establishes biodiversity conservation as an objective to be furthered through land use planning, the lack of clear and consistent policy direction and lack of integration and coordination across the different pieces of legislation under the RMPS, as well as between the RMPS and FPS, has resulted in considerable contention about whose role it is to assess impacts on biodiversity and at what stage of the land use planning process.

Views of survey respondents on the current and ideal roles of the different agencies in assessing impacts on biodiversity as part of the land use planning process show that 76.5% (n = 26) of respondents considered local government to be the current primary regulator (Figure 3.4). Less than

50% of respondents also identified the FPA, DPIPWE and the Commonwealth as having primary regulatory roles in considering the impacts of use or development on biodiversity as part of the development approval process (Figure 3.4). These responses reflect the complex regulatory arrangements currently in place and acknowledge that multiple regulators operate in this space depending upon the values being impacted and the activity undertaken. However not all survey respondents considered local government to be the current primary regulator (Figure 3.4). According to one survey respondent:

> At present the parliament has not dictated that the planning system has a specific role in biodiversity conservation. It is an implied outcome for the more broadly stated purpose in 'sustainable development' under the RMPS, and it is an allied consideration called into play by the objectives in LUPAA. … However, Parliament has not said the planning process must assess and determine bioconservation [sic] outcomes. It has assigned such tasks to other agencies (currently DPIPWE) although it does not appear to have adequately equipped them to establish a compulsory connection between conservation objectives and the processes under LUPAA (Survey Respondent).

The comments of this respondent highlight the view that, in the absence of an act of parliament stating otherwise, it is not the role of local government as statutory planning authority to regulate impacts on biodiversity resulting from development otherwise regulated under LUPAA, and rather, it is thought to be the role of other agencies.

When asked who the ideal primary regulator was, as distinct from the current regulator, 72% (n = 25) of respondents indicated local government to be the most appropriate regulator and 48% (n = 16) nominated DPIPWE as the most appropriate regulator (Figure 3.4). The responses also indicated that the FPA and Commonwealth should have less of a role than they currently do (Figure 3.4). Those whose professional role predominantly involved considering the impacts of use or development on biodiversity as part of the development approval process were the most unequivocal in their views that local government was and should be a primary regulator of impacts on biodiversity as a result of land use planning decision. The results also indicate that the role of the FPA, DPIPWE and the Commonwealth were generally considered to be more appropriate as referral agencies than regulators (Figure 3.4).

The interview data highlight differing views on the appropriate primary regulator, with many linking ambiguity in this role with the lack of clear policy direction.

> Certainly for biodiversity, I think there needs to be a policy statement on what it should be, and it should be something that applies, obviously, to the whole state. Now even if it's, for example, this whole idea of lower levels of government being gatekeepers for higher levels of government. Local government has to do whatever State Government tells it to do. For example, the State Government policy position might say, all those things that are threatened veg-stuff recognized by the State legislation, local Council planning schemes must act as a gatekeeper at the front counter to ensure where necessary things are referred to at the State, the relevant authority to deal with

> something. That would be a legitimate thing for the State to tell Councils to do, but it's got to be something they actually do tell them, tell us to do, not left vague and fuzzy, and no one mentioning it, and then we all get to finishing writing these new planning schemes, all of a sudden, is this something that our planning schemes are gatekeeper for State Government stuff or not? (Survey Respondent).

Lack of clarity around roles was identified by 31% (*n* = 11) of interviewees across all areas of expertise (planning, biodiversity NRM and regulation), by those within State and local government as well as those outside of government. Statements supporting local government as the appropriate regulator and the planning system as the appropriate statutory mechanism for considering impacts on biodiversity were predominantly made by interviewees with expertise in biodiversity (*n* = 18, 50%).

> If you look at the three tiers, which of those three tiers is most in tune with what's happening in their backyard. Now you'd have to say local government. It's got to be the local government level that most know what is happening in their patch. So everybody pays rates, everybody knows where their local government office is, you know, that one-stop shop. And that's not saying that local government has become a one-stop shop for lots of things, and it's a one-stop shop for that's where you can put your development application (NGO Expert 2 2015).

> Certainly from our perspective the planning system is the key to ensuring biodiversity is managed effectively. I don't think it can be done separately from that because level one activities are the ones that actually have the impact and they are fragmenting habitat and all of those things. So I think it's essential that the planning system deals effectively with biodiversity (NGO Expert 1 2015).

> Ideally, I think those sort of considerations should be embedded in Council and Council's adequately resourced with that sort of stuff, with those sort of skills and understanding… when it goes to Council, you want someone in Council, or you want the mechanisms in Council and the planning tools in Council (State Expert 6 2015).

In contrast, statements questioning the role of local government were predominantly made by interviewees with planning expertise (*n* = 23, 73%) and from those within local government (*n* = 22, 64%). As the following quotes illustrate, the view that local government is not the appropriate regulator is in part driven by the perception that local government planning decisions do not have a significant impact upon biodiversity and in part by the view that making decisions at the local scale is not meaningful.

> What are the things that influence biodiversity on a regional scale and how many of those are in control of local government? Probably not many, really. How many land management decisions do we actually deal with on a regional scale of significant impact? Not many. I have been hesitant to put a figure on it but if think about all the totality of biodiversity impact on a regional scale and how any of them are as a result of a permit issued by Council? I would say a fraction (Manager Planning 5 2015).

> By and large, the big impact activities are regulated by other agencies and other regulations (Manager Planning 1 2015)
>
> If you're limited to your own municipal jurisdictions, it's pretty hard to try and understand what you're trying to achieve overall (Environmental Planner 1 2015).

These results indicate that those operating at the local scale are less likely to consider the decisions they make have significant implications for biodiversity and they tend to consider the State is best placed to address impacts. Whereas those operating at the State level consider smaller-scale impacts from land use planning decisions are an issue and that those at the local level are better placed to address biodiversity impacts from these decisions. In the absence of clear direction from the State establishing just whose role it is and why it's important, achieving substantive biodiversity conservation outcomes through land use planning conveniently remains someone else's responsibility.

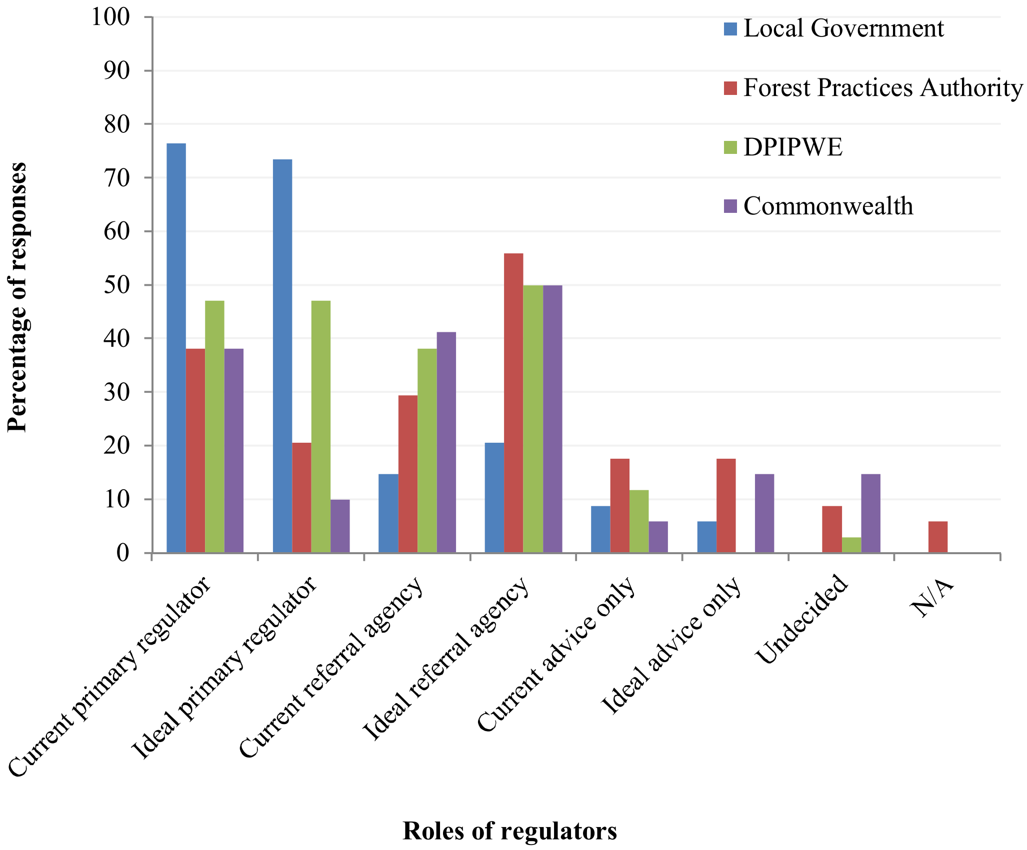


Figure 3.4 Survey responses from 34 local government officers with a role in land use planning, biodiversity regulation and/or natural resource management (NRM) on the roles of different regulators in biodiversity conservation

Source: Survey of all Tasmanian Councils conducted in April 2014 as part of this research.

3.3 The shifting goal posts of statutory planning instruments

In the absence of a clear policy framework and integration between regulations, integration of biodiversity conservation in land use planning, and whose role it should be, remains contested. Notwithstanding, whether by design or default, since 2009 statutory planning schemes have been the key regulatory mechanism for integrating biodiversity conservation into land use planning decisions and local government as planning authority the primary regulator. The inclusion of provisions in statutory planning instruments requiring that they further the biodiversity conservation objectives of their parent act arguably ‘enable planning authorities to express in environmental planning instruments more detailed requirements than may be proscribed by the legislation under which they are authorised’ (Bates 2013:277). Therefore, planning schemes provide a mechanism by which the objective of biodiversity conservation can be translated into tangible and meaningful biodiversity conservation outcomes.

A planning scheme regulates the way land can be used or developed and establishes the overall approach to planning in each local government area (LGA) (Tasmanian Planning Commission 2017c). It includes standards for the use, development and protection of land, specifying when planning permits are needed and the requirements and criteria for development assessment (Gurran 2011; Tasmanian Planning Commission 2017c). An application must be made for any use or development for which a permit is required under the applicable planning scheme. Under s3 of LUPAA, development includes not just the construction or alterations of buildings, it also includes subdivision and works. Works in turn are defined as ‘any change to the natural or existing condition or topography of land including the removal, destruction or lopping of trees and the removal of vegetation or topsoil’ (s3 LUPAA). Planning schemes categorise types of development according to use classes and whether these uses are no permit required, permitted, discretionary or prohibited (Bates 2013; Gurran 2011; Tasmanian Planning Commission 2016b).

Currently each of Tasmania’s 29 LGAs have a planning scheme, with the exception of the Hobart City Council which has two planning schemes (a separate scheme for the Sullivans Cove area and another for the remainder of the Council area) (Tasmanian Planning Commission 2017c). PD1 establishes that schemes are comprised of special provisions, zone provisions, code provisions and specific area plans (Tasmanian Planning Commission 2016b). The way in which a scheme operates is a direct function of the hierarchy between these components. Zones are the primary controls for the use or development of land, whereas codes identify areas or planning issues which may affect more than one zone and cannot conform to zone boundaries. Essentially codes provide for additional provisions. Where there is a conflict between a provision in a code and a provision in a zone, the code provision prevails. Specific area plans (SAPs) identify areas either within a single zone or covered by a number of zones, and set out more detailed planning provisions for use or development in those areas. In the event of a conflict in provisions between a SAP and provisions in a zone or code, the SAP prevails. Special provisions sit at the top of the planning scheme hierarchy and allow for provisions for certain types of use or development, that are not specific to any zone, specific area plan, or area to which a code applies.Therefore, where there is a conflict between a provision in a zone, code or SAP and a special provision in Part C, the special provision in Part C prevails (Tasmanian Planning Commission 2016b). Within each of the components there is usually a combination of text, known as ordinance, and overlays or statutory maps, which identify the spatial application of the ordinance. In some instances the application of ordinance may be via description referred to as textual application, a combination of textual application and statutory map, or just a statutory map (section 5.1).

Within each zone, code and SAP is the ordinance or applicable standards which a use or development must meet. These standards set the tests to meet the stated objectives, which are framed as either an acceptable solution or performance criterion. The distinction between an acceptable solution and a performance criterion is that, if a proposal satisfies all relevant acceptable solutions, it is a permitted application and must be approved, albeit subject to conditions. Whereas, a proposal that requires assessment against the performance criteria is a discretionary application and hence the planning authority has the discretion to refuse the application or approve it subject to conditions.

Like other jurisdictions in Australia, Tasmania has been experiencing relentless cycles of planning reform. This cycle of reform has seen the transition from more than 29 individual planning schemes (pre-interim schemes), to 3 regional model schemes with local variation (interim schemes), to the Tasmanian Planning Scheme (TPS). Consequently, the goal posts for biodiversity conservation in statutory planning instruments in Tasmania keep shifting.

3.3.1 Integration of biodiversity under pre-interim schemes

Until 2015, when there were significant changes to LUPAA, the responsibility for developing and implementing planning schemes sat with local government, as the statutory planning authority. The introduction of the RMPS saw the first steps towards developing more consistent planning schemes based on model templates. However each statutory planning authority was still responsible for drafting their own planning scheme(s) and from the introduction of the RMPS in 1994 until the introduction of interim planning schemes almost 20 years later in 2013, only three planning schemes were developed and declared based on the model performance-based templates (Kingborough, West Tamar and Break O'Day). Consequently, despite the introduction of an apparently 'integrated system', there was little consistency between schemes and significant variation in planning controls in relation to biodiversity.

> It just falls to each individual Council to have regard to those things in the ways it sees as appropriate (NGO Expert 1 2015).
>
> In my experience… through weaknesses in their older schemes, they've not had to deal with it [biodiversity] (Ecological Consultant 2 2015).
>
> In our '86 scheme, a house was a permitted use, no veg controls, being a scheme of that period. With the 2006 scheme, there was provision in there to say that you could have a house provided it was based on natural cultures values management… So we've turned the previous practice on its head, and we're actually getting better environmental outcomes from people who actually want to live in that kind of area and look after the land (Statutory Planner 1 2015).
>
> Across different Council areas you see quite different ways that they deal with or don't in fact deal with, and I am talking historically, with biodiversity… to compare Kingborough Council with Brighton Council with Tasman Council, with some of the Councils of the North West or which we have dealt with developments that sort of had an impact on biodiversity, ranges from zero

> consideration through to specific schedules codes that deal within some data. Most Councils historically are for a zero to a small amount. The Brighton Planning Scheme for example, at the time of the Brighton Bypass and Transport Hub … didn't deal with impacts to vegetation at all. Whereas those developments certainly had a pretty major impact on biodiversity (Consultant Planner 2 2015).

Poor consistency between schemes and variation in planning controls in relation to biodiversity were the state of affairs when the FPS was amended in 2009 to effectively devolve responsbility to local government for regulating impacts on biodiversity. Consequently, at the commencement of this research many planning schemes were dated and generally not designed to address impacts on biodiversity. Many Councils were not equipped to take on a primary role in biodiversity conservation and only those Councils with specific controls in their planning schemes in relation to native vegetation were able to potentially consider biodiversity impacts (Southern Tasmanian Councils Authority 2013). The sudden nature of the amendments to the FPS, with no notification of or consultation with Councils, also created considerable confusion and angst, resulting in different interpretations of the meaning of amendments.

> The change to the forestry regulations in 2009 did not devolve responsibility to local government for the development types mentioned. They simply stated that a forest practices plan is not necessary. [Our] Council wrote to the Minister for Planning (and Forestry) asking for clarification on this matter. We did not receive a written reply (Survey Respondent).

> My interpretation of the changes was to say that we're stepping aside from the forest practices plan process and Councils need to have an equivalency under the LUPPA permit process (State Expert 6 2015).

> Well when it first happened, all the Councils and the consultants were so cross with us. How could we possibly do that? 'We can do that. We have. We've done it. Go away and work it out' (State Expert 2 2015).

> You know, certain people in some State agencies interpreted those changes one way, and certain people in other State agencies interpreted another way, and local Councils were sort of all at sea to start off with about what it actually meant for them… so some people from the State were there saying, 'Oh, Councils have to do this'. And then some Councils put up their hands saying, 'Well, actually, our planning scheme doesn't give us any ability to do that' (Survey Respondent).

Where Schemes did enable consideration of biodiversity, the provisions were often broad and there was considerable uncertainty around Council's legal right or 'head of power' for mechanisms such as offsets where the Scheme does not specifically provide for offsets (*AAD Nominees Pty Ltd v. Kingborough Council* [2011] TASRMPAT 6 and *H and A van Beelan v Kingborough Council* [2010] TASRMPAT 245).

3.3.2 Integration of biodiversity under interim schemes

The development of regional land use strategies and the introduction of interim planning schemes incorporating Planning Directive No. 1 (PD1) saw a move towards greater consistency, with planning schemes based on a common format, structure and zones referred to as the Common Key Elements Template (Tasmanian Planning Commission 2014). However the planning provisions and codes were based on the regional land use strategies and allowed for variation at the regional and local level.

Associated with the introduction of the interim schemes was a perception that biodiversity was more explicitly integrated into planning schemes across most LGAs than under pre-interim schemes.

> I think the planning system is getting better at dealing with biodiversity. Certainly ensuring that all of the new schemes at least have a biodiversity code is a big step up (NGO Expert 1 2015).

Despite this perception that interim schemes are better, the survey results suggest that biodiversity considerations were procedurally integrated into local government statutory planning in Tasmania to a reasonable extent under both pre-interim and interim planning schemes. At the time of the survey over 65% (n = 23) of respondents were of the view that the impacts of development on biodiversity were routinely considered by their Council as part of the development approval process (Figure 3.5). Over 50% (n = 18) of respondents indicated that conditions of approval were routinely included in development use permits to address impacts on biodiversity and the remainder of respondents indicated conditions were used occasionally by 48.5% (n = 17). Of the respondents who considered biodiversity was routinely integrated into approval processes, 45% (n = 8) had pre-interim planning schemes and 55% (n = 10) had interim schemes in effect at the time of interview (Figure 3.5). No respondents were of the view that the impacts of use or development on biodiversity as part of the development approval process were never assessed (Figure 3.5).

Where there was more than one respondent within a specific LGA, there was some variation in response to the question of how frequently biodiversity is integrated into the development approval process. For over 60% of LGAs with more than one respondent, the answers varied between respondents. This suggests that perceptions of how biodiversity is considered as part of the assessment process depends somewhat upon the role of the respondent. When responses were viewed by role, over 90% (n = 14) of those with a referral role considered biodiversity considerations to be routinely assessed, compared to just over 70% (n = 17) for those with a statutory role (Figure 3.5). Of those with a statutory role, less than 50% (n = 8) of statutory planners considered biodiversity considerations to be routinely assessed, whereas all strategic planners considered biodiversity to be routinely integrated (n = 18, 100%) (Figure 3.5). When responses were viewed by region, integration of biodiversity appeared to be more routine in the South and North of the state than the North West (Figure 3.5).

Over 70% (n = 24) of respondents considered that the planning scheme in effect at the time of survey included scheme, zone and code objectives aimed at maintaining and/or protecting biodiversity (Figures 3.6 and 3.7). Yet less than 50% of respondents identified the planning scheme in effect at the time of survey as containing specific zone or code standards (Figures 3.6 and 3.7). When the results were considered according to the status of the planning scheme in effect, it was evident that a higher percentage of respondents with interim schemes than pre-interim schemes considered the scheme contained biodiversity related scheme and zone objectives (83% versus 68%) (Figure 3.6). Whereas, a higher percentage of respondents with pre-interim schemes considered their schemes contained specific code standards relating to biodiversity than those with interim schemes (53% versus 42%) (Figure 3.6). While there were slight variations in responses according to scheme status, there was no meaningful difference between the pre-interim and interim schemes in terms of inclusion of planning scheme provisions aimed at maintaining and/or protecting biodiversity.

When viewed by role, there was some variation in the extent to which those in different roles considered planning scheme provisions were integrated at the level of objectives or standards (Figure 3.7). Despite this variation, the general trend was a perception that biodiversity was integrated into statutory planning instruments more at the level of principles and objectives, rather than within specific zone or code standards. This view was particularly the case for statutory planners, with less than 20% (n =4) of statutory planners considering that planning schemes contained zone provisions specifically aimed at maintaining and/or protecting biodiversity (Figure 3.7). When responses were viewed by region, the same trend was evident (Figure 3.7). However, there was more confidence from respondents from Northern LGAs than the South or North West that the schemes in effect at the time of the survey included scheme, zone or code objectives aimed at maintaining and/or protecting biodiversity.

This tendency for biodiversity to be integrated into statutory planning instruments at the level of principles and objectives, rather than specific standards, may go some way to explaining why strategic planners viewed biodiversity as routinely considered as part of the development approval process, compared to less than 50% (n = 8) of statutory planners. The inclusion of biodiversity conservation objectives at the scheme, zone or code level potentially gives the impression that biodiversity is also integrated at the level of standards. As it is the role of strategic planners to assess planning scheme amendments at the level of objectives rather than against the standards, they may be less cognisant of how these objectives are translated into standards. In contrast, statutory planners are required to assess proposals in relation to the standards themselves. Subsequently they can only rely upon objectives where these objectives are specifically referenced in the standards. As stated in Clause 8.10.2 of PD1:

> In determining an application for a permit for a discretionary use the planning authority must, in addition to the matters referred to in subclause 8.10.1, have regard to:
>
> (a) the purpose of the applicable zone;
>
> (b) any relevant local area objective or desired future character statement for the applicable zone;
>
> (c) the purpose of any applicable code; and
>
> (d) the purpose of any applicable specific area plan,

but only insofar as each such purpose, local area objective or desired future character statement is relevant to the particular discretion being exercised' (Tasmanian Planning Commission 2016b).

In other words, the planning authority can only have regard to objectives relating to biodiversity conservation where the standards themselves require some consideration of biodiversity or call upon the objectives more generally. Conversely, where the objectives have not been translated into performance criteria, there is no head of power for taking such objectives into consideration. As one interviewee put it, 'there's got to be a link' between the objectives of the scheme and specific standards within a scheme (Consultant Planner 1 2015). As the interviews highlight, the problem for many schemes is that 'there are some broad statements there, but they're not really that strong enough' (Manager Planning 3 2015). Therefore, in the absence of relevant standards in a planning scheme, there is no requirement for the explicit consideration of biodiversity. This lack of translation from objectives to standards has significant implications for achieving substantive biodiversity outcomes (sections 4.1 and 7.3). Providing it is possible to demonstrate compliance with all relevant standards, the higher level objectives are considered satisfied, irrespective of the actual outcome.

While the survey and interview results suggest limited translation of biodiversity objectives into standards, these results represent perceptions of the planning schemes in effect at the time of data collection. These planning schemes were a combination of pre-interim and interim planning schemes. Upon declaration of all 28 interim schemes, integration of biodiversity conservation into planning schemes generally and into standards specifically appeared to strengthen, with 26 out of 28 (or 93%) of interim planning schemes incorporating a biodiversity or natural values code of some description into their interim schemes.[15] These codes all include specific standards which afford a level of consideration of impacts on biodiversity. Variations and limitations in code application are discussed further in section 5.1. In addition to biodiversity-type codes, there are also a number of zones under the PD1 template for interim schemes (Tasmanian Planning Commission 2014) which potentially provide for consideration of biodiversity values. The key zones providing for biodiversity conservation are the Environmental Living and Environmental Management zones. The provisions for these zones include both objectives and standards of relevance to biodiversity conservation. Variations in and limitations of zone application are discussed further in section 5.2.4.

Conditions of approval also provide a mechanism for addressing impacts on biodiversity and achieving biodiversity conservation outcomes. Unless the decision is to refuse a proposed development, conditions of approval give effect to the outcome of the decision-making process by establishing the terms upon which a development must proceed. As determined in Western Australian Planning Commission v Temwood Holding Pty Ltd [2004] HCA 63, permit conditions must be imposed for a proper planning purpose as determined by the performance criteria and fairly and reasonably relate to the development (Bates 2013). To be effective, permit conditions must also be time-bound, specific and enforceable.

[15] The two exceptions are Central Highlands Council and Derwent Valley Council, which do not have a biodiversity code or equivalent.

> It's all about the wording of the condition as to whether it's an enforceable thing or not or a useful thing in term of managing impacted species (State Expert 4 2015).

At present there are no agreed standard conditions for use by planning authorities and as such the wording of permit conditions is at the discretion of each planning authority, unless the application is subject to appeal. There is also a lack of monitoring, compliance and enforcement of permit conditions, with 66% of survey respondents indicating that conditions on permits are only occasionally enforced (*n* = 23).

> Arguing about whether we should allow a small development to go ahead is really really small fry compared to when a development does go ahead, how much are you going to see disappear, once all development process has settled down two years on, when the compliance process really doesn't happen... and the people are just having a field day and park-scaping. Not only that, all our habitat trees, all our hollow-bearing trees or potential hollow bearing trees are just disappearing under our feet … as a consequence of the planning authority's inability to enforce and comply (NRM 3 2015)

> The Council is all about getting approval. Once that approval is gained, how do they then manage those values to ensure that best intent of protecting those values is actually ensured? And that's probably the biggest weakness in the whole system at the moment… very rarely do they ever require any auditing or reporting to ensure the proponent has actually done what they are supposed to have done (Ecological Consultant 2 2015).

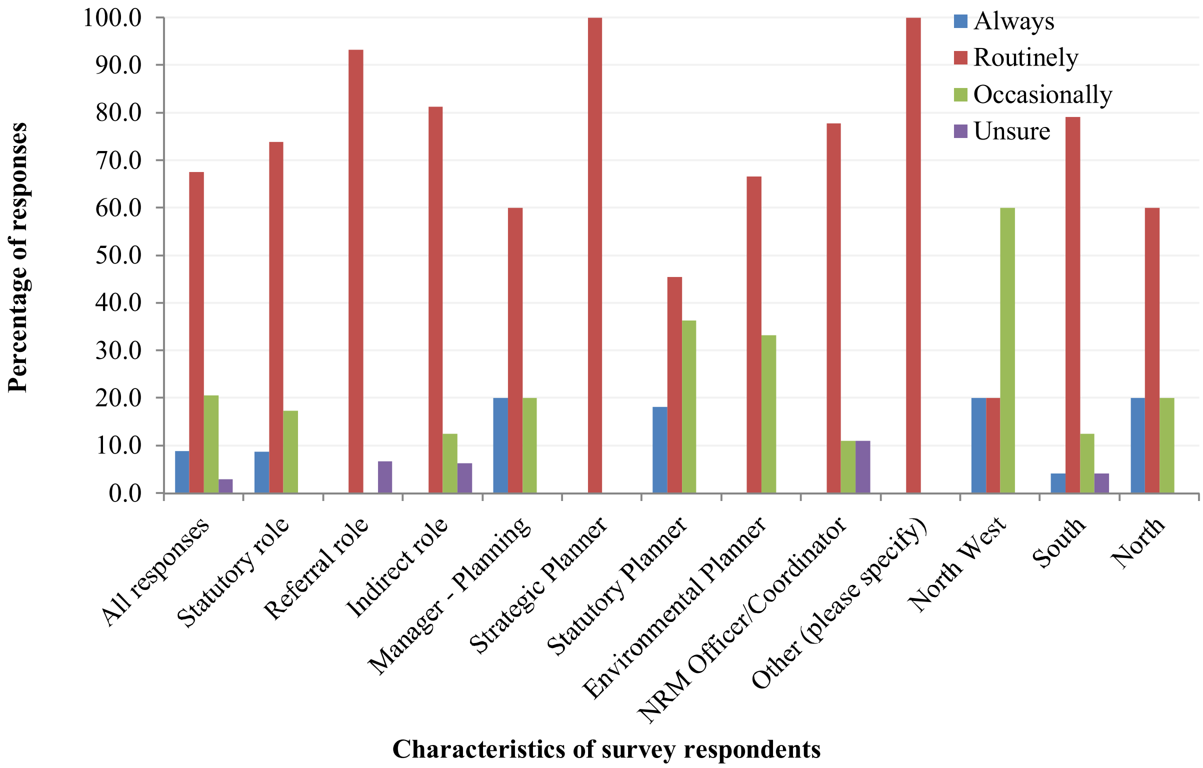


Figure 3.5 Survey responses from 34 local government officers with a role in land use planning, biodiversity regulation and/or natural resource management (NRM) to the question:

How often does your Council currently consider the impacts of use or development on biodiversity as part of the development approval process?

Source: Survey of all Tasmanian Councils conducted in April 2014 as part of this research.

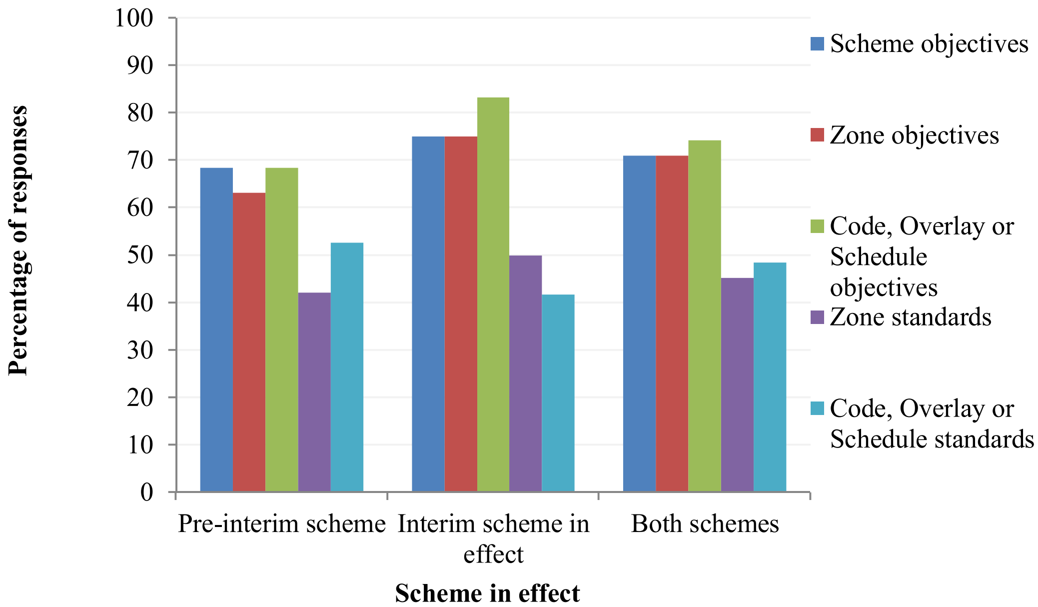


Figure 3.6 Survey responses from 34 local government officers with a role in land use planning, biodiversity regulation and/or natural resource management (NRM), grouped by scheme in effect, to the question:

Do the planning schemes in your municipality currently include any of the following planning scheme provisions aimed at maintaining and/or protecting biodiversity? (Select all that apply)

Source: Survey of all Tasmanian Councils conducted in April 2014 as part of this research.

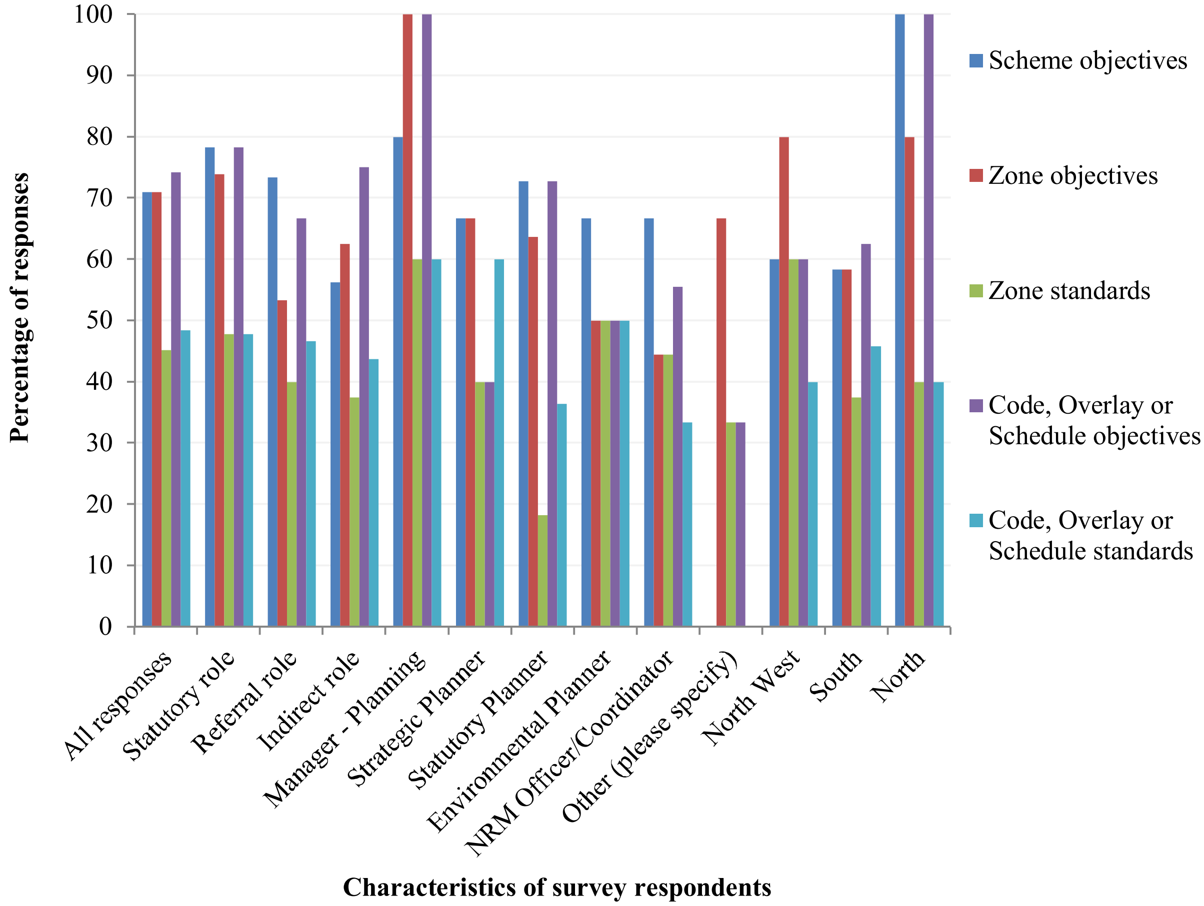


Figure 3.7 Survey responses from 34 local government officers with a role in land use planning, biodiversity regulation and/or natural resource management (NRM) grouped by characteristic to the question:

Do the planning schemes in your municipality currently include any of the following planning scheme provisions aimed at maintaining and/or protecting biodiversity? (Select all that apply)

Source: Survey of all Tasmanian Councils conducted in April 2014 as part of this research.

3.3.3 Integration of biodiversity under the Tasmanian Planning Scheme

In 2014, the development of a single statewide planning scheme commenced, with the formation of the Planning Taskforce and in 2015 LUPAA was amended to provide for the introduction of the TPS. The purpose of these reforms was to ensure planning in Tasmania would be simpler, fairer and more efficient (Planning Policy Unit 2017). These reforms represent a significant shift in how planning schemes have traditionally been developed in Tasmania, which was at the level of individual LGAs (section 3.3.1). Following amendments to LUPAA in 2015, the responsibility for drafting planning schemes now rests with the State.

> There are 29 Councils who up until 5 minutes ago, and in a space of 'like that', were held accountable for their planning schemes. 'These are your planning schemes. You are responsible for making them, defending them, reinforcing them, varying them.' And all of a sudden local government has been told 'You are incompetent. You haven't achieved consistency. You have wasted seven years of this planning reform process. There isn't consistency. You don't know how to do your job. We are taking it away from you' (Manager Planning 4 2015).

The TPS is the single statewide planning scheme providing a consistent set of statewide planning rules and once in effect will replace the 29 interim planning schemes operating in Tasmania (Tasmanian Planning Commission 2017e). The TPS comprises two parts:

1. the State Planning Provisions (SPPs), which include the identification and purpose, administrative requirements and processes, exemptions, zones with standard use and development provisions, and codes with standard provisions; and,
2. the Local Provision Schedules (LPSs), which apply to each LGA, including zone and overlay maps, local area objectives, code lists, particular purpose zones, specific area plans, and any site-specific qualifications (Tasmanian Government 2018) (Figure 3.8).

The SPPs came into effect on 2 March 2017. Notwithstanding, the SPPs will not apply and the TPS will not come into effect until the LPS for each LGA has been approved by the Minister. All LGAs have now commenced preparation of their draft LPSs for assessment and approval and 3 LPSs are currently under assessment (Figure 3.3). However, until this process is complete, the interim schemes continue to apply.

Under the SPPs, the level of standardisation in biodiversity-related planning scheme provisions will increase, with all schemes required to incorporate the Natural Assets Code (NAC) using consistent code application guidelines. The aim of the NAC is to provide balance and clarify under what circumstances development can take place (Tasmanian Planning Commission 2017f). The biodiversity provisions in the NAC are intended to provide for the protection of: threatened native vegetation communities; threatened flora species; significant habitat for threatened fauna species; and, other locally important native vegetation, in conjunction with State legislation such as the NCA, TSPA and FPA (Tasmanian Planning Commission 2017b). When these reforms come into effect, all statutory planning schemes will incorporate consistent biodiversity provisions for the first time in Tasmania.

While the purpose of these reforms was to simplify planning and improve consistency, interviewees from government and non-government, sectors and State and local government expressed scepticism about the ability of the TPS to achieve its intended purpose.

> Apart from the fact that I think they're creating a more confusing situation for developers, the changes are potentially more complicated, I think we will have a worse situation for biodiversity (NGO Expert 3 2015).

> Every time the Minister talks about planning you get ‘fairer, faster, cheaper and simpler’. You get ‘consistency’. You get ‘the existing planning schemes, there is no consistency. There is only 15% consistency and this is terrible for investment. This is terrible for development. The State is going backwards because of the planning scheme. There is a bottleneck of development waiting to happen that can't because of the planning scheme’. Be honest. There’s not. So they’re building this expectation that suddenly things are going to be so much simpler, faster, cheaper. You won't have to engage planning consultants. You won't have to pay permit application fees. You won't have to wait over night to get your permit. The reality is it's going to take longer and I think in a lot of

> instances unfortunately it's going to be more expensive, it's going to be more complicated and it will be less fair (Manager Planning 4 2015).

> And again there's the whole reform thing, they're not asking people that work in it… The people that are making the decisions aren't the people that actually work with it every day, and I don't think there's this upward feedback at all. So, the reforms that are going to be made are probably going to be really clunky and ineffective (State Expert 5 2015).

While the survey and interviews suggest a need for consistency across planning schemes, the need for consistency was often qualified with the importance of providing for local variation (Figure 3.9). One of the concerns with State mandated consistency is the view that these provisions will be too weak, and yet Councils will be precluded from increasing the level of protection being provided through adopting additional local standards, as they can under the interim schemes.

> I think that's where it could head because if we're going to be told what we can and can't do in our planning schemes, if the State is not strong on it then it could be the Councils, Kingborough Council for example, is actually instructed to get out of that space altogether, and won't have that ability to kind of go at it alone a bit (State Expert 3 2015).

> The thing that scares me about it [a State biodiversity code], is that it would be watered-down so much (NRM 2 2015).

> So in terms of where all of us are heading, for example if a State scheme removes local government involvement, or planning involvement in those issues, it's going to be interesting to see what the on ground results are going to be, whether they let us value add and get a slightly better result (Manager Planning 2 2015).

> I don't know if it will help or not but theoretically it should as long as it's not too easy on things. I'm a bit worried that it may not take enough interest in the environment (NRM 5 2015).

Only 26% (n = 9) of respondents agreed or strongly agreed with the statement that there should be statewide consistency in a biodiversity code with no regional or local variation and 62% (n = 21) disagreed or strongly disagreed with this statement (Figure 3.9). Whereas 68% (n = 23) of respondents considered statewide consistency with a level of regional or local variation was desirable and only 26% (n = 9) disagreed or strongly disagreed with this statement (Figure 3.9). Similarly, only 12% (n = 4) of respondents agreed or strongly agreed with the statement that there should be regional consistency in a biodiversity code with no local variation and 68% (n = 23) of respondents disagreed or strongly disagreed with this statement (Figure 3.9). Slightly fewer respondents were in support of a regionally consistent code with local variation (n = 22, 65%) than in support of a statewide code with variation (n = 23, 68%) (Figure 3.9). Only 32% (n = 11) of respondents were of the view that each LGA should have the discretion to determine their own biodiversity code, 71% (n = 24) agreed or strongly agreed that a biodiversity code should be mandatory, and 76% (n = 26%) respondents disagreeing or strongly disagreeing that LGAs should have the discretion to adopt, or not adopt, a biodiversity code (Figure 3.9). The general view across respondents supported a move towards regional or statewide consistency, providing there was also the ability for some variation at the local level. However extending this local variation to the point where LGAs can develop their own code or opt out altogether was largely unsupported.

When viewed by type of role, there was variation in views between those with a direct statutory role, a referral role or an indirect role. There was also variation in views within all roles (managers, strategic planners, statutory planners, NRM and others) with the exception of environmental planners. In response to all statements, apart from whether or not LGAs should have the discretion to determine their own code, there was 100% consistency in responses. Environmental planners are arguably the most closely involved in assessing impacts of land use planning decisions on biodiversity. The responses of environmental planners unequivocally supported consistency, with a level of local variation, and also supported the requirements that adopting a biodiversity code be mandatory.

Thirty-six percent (n = 12) of interviewees made statements in support of greater statewide consistency. However 2 interviewees also acknowledged that even where the provisions themselves are standardised, there will be still considerable room for interpretation.

> What we'll up with I think is a process where government can say 'Look biodiversity is being dealt with'. And when you start watching 29 Councils and a range of bureaucrats in the Planning Commission try to actually implement that process, we'll see wildly differing outcomes, we'll see terribly compromised decision making, because people don't have any set of core outcomes they're meant to achieve (State Expert 3 2015).

> I think standardised scheme provisions would be a very good outcome. I don’t think that it’s going to do anything for the Councils that choose to interpret things differently so they can be more difficult or more lenient. And I think it will be simply the same arguments from a slightly different perspective. We’ll have another period of probably five to ten years of regurgitation, reform and general frenzy, and then things will settle down to be pretty much the same as they are now, because this Council will interpret it this way and that Council will interpret it that way (Statutory Planner 1 2015).

While consistency was supported in principle by 36% (n = 12) of interviewees, as with the survey data, the importance of local variation between planning schemes was also highlighted by 30% (n = 10) of interviewees. Support for local variation was expressed by interviewees across a range of roles and areas of expertise, at both levels of government as those outside of government, across all regions, by those with a direct and indirect role in regulation and across rural and urban LGAs.

> I am not enormously comfortable with imposing a very strict regime. I am not saying there shouldn't be any controls for the important values but over and above that there are certain communities that care a lot more and I think that they should be able to have protection if they collectively want that protection for their area. But I am not suggesting that high what some people might expect is mandated over entire municipalities (Manager Planning 5 2015).

> There has to be a place for this in the planning system. Even if you look at say there were local values of a particular area for its biodiversity, they're community values and I think it's good to have those areas identified and considered (State Expert 7 2015).

> A Council should be able to say, 'if we have these particular things in our Council area that we think are really important in our Council area then we're going to add an extra level of control over those things' (Ecological Consultant 4 2015).

> I think, in terms of value and if we're going to say there's a hierarchy of values which matches with the hierarchy of elected representation - Global, State, Federal - then I think Councils should have the ability to say, 'Our community values this bush, these landscapes, this heritage, the State has chosen not to recognize and protect it but our community wants it recognised and protected because we deem it to be of local significance', and I think Councils should have the ability to do that in their schemes (Manager Planning 1 2015).

> If there is a push for consistency I think there is a tendency for the urban based Councils to dominate that because the thinking of those who are drafting is urban based. What's going to happen is I don't think it's going to make it simpler. Things are going to be brought into this planning scheme that are irrelevant to certain parts of the State in the interest of consistency (Manager Planning 4 2015).

> I do fully support their [Central Highlands] view that they don't and should not have a biodiversity code because there's a lot of protection up there through better mechanisms, through reserves and conservation covenants and Tas Land Conservancy. A lot if it's already protected… they don't have that sort of urban development pressure on it. So where they lose is forestry and agriculture, and that's already outside the planning system anyway (Statutory Planner 3 2015).

These quotes illustrate that the desire for local variation was driven by a number of different perceptions and views. One of the most commonly expressed views was the idea that local land use planning is best placed to, and indeed should, respond to community values. Similarly, enabling variation in values being protected by a planning scheme allows each planning authority to identify values that may be significant at a local scale but not necessarily a regional, statewide or national scale. Allowing local variation also enables Council experiencing greater pressure on biodiversity to apply additional local standards to achieve improved biodiversity conservation outcomes.

Another theme supporting local variation was the idea that biodiversity conservation was not as big an issue in some LGAs. This may be because the values aren't considered to be present where there is development pressure; therefore there is no need for consistent application of regulations. Or alternatively, in some rural LGAs, the risk to biodiversity relates to land management practices and sits outside the planning process.

> I think there are different areas of biodiversity that need to be protected and dealt with differently… I think some of these issues are somewhat unique to Kingborough, and maybe Clarence has similar issues, but I think some of the other Councils, you go into the Midlands, the biodiversity issues there are completely different with all the grassland issues… In those cases,

> protecting biodiversity is better achieved by supporting the landowners. And whether that's financial incentives or advice from DPIPWE or Tasmanian Land Conservancy (State Expert 7 2015).

This quote highlights that development is only one driver of biodiversity decline and the land use planning system one tool to achieve biodiversity conservation outcomes. In areas where the potential impacts are from inappropriate land management practices, pro-active private land conservation programs provide more appropriate protection measures than regulation.

The existence and importance of other biodiversity conservation measures is not disputed. Notwithstanding, land use planning and planning schemes are the mechanism for addressing biodiversity impacts in the event that a development impacting on biodiversity is proposed. Therefore, whether development pressure is high or low, there remains the need for a consistent biodiversity code that establishes a minimum default standard.

> I don’t see how we could ever justify not having one as being a standard code of a planning scheme (Environmental Planner 2 2015).

> In my view on the planning reform process ... I am quite happy with that being the default provision, that if the community doesn't care or the Councils aren't interested, then there’s a default that sets the minimum provision that you might expect in a civilized society. Then if the community care, then there should be the ability for the community to add a layer on there that actually says that ‘We as a community care and so we going to look after our biodiversity’. Well not minimum, but responsible. A balanced approach but a default (Manager Planning 5 2015).

As these quotes illustrate, some interviewees considered that, in addition to enabling local variation in the values being protected, LGAs should also have the discretion to provide stronger protection for biodiversity. Therefore, while consistency in provisions and terminology was generally supported, there was also strong support for allowing a level of local variation.

> I'd like to see simplicity where you can but without going simplicity so far that you lose the ability for the detail... I think if we started using the same language between areas... the values may be different, but the issues and threats will be largely the same. And the tools then to deal with that will be largely the same but in a different context (Ecological Consultant 3 2015).

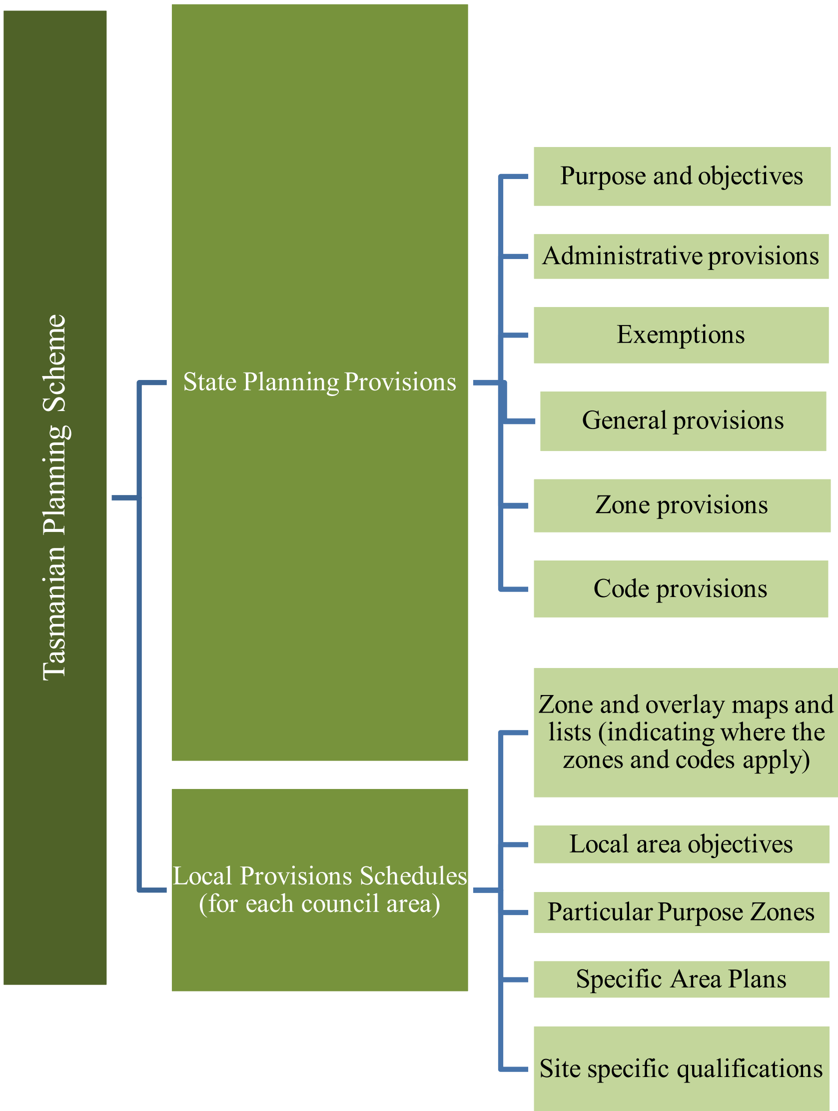


Figure 3.8 The structure of the Tasmanian Planning Scheme

Source: Tasmanian Planning Commission (2017e)

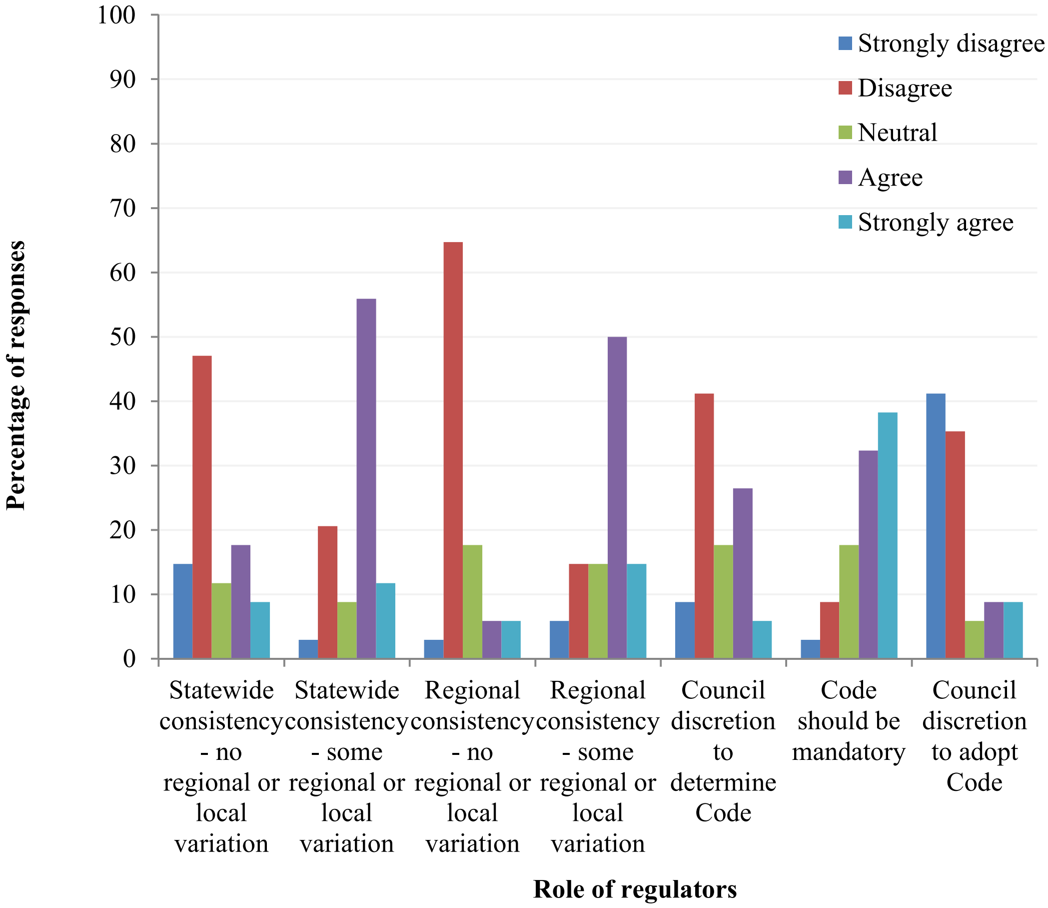


Figure 3.9 Survey responses from 34 local government officers with a role in land use planning, biodiversity regulation and/or natural resource management (NRM) to a range of statements regarding the desirable levels of consistency between planning schemes

Source: Survey of all Tasmanian Councils conducted in April 2014 as part of this research.

3.4 Conclusion

The RMPS and LUPAA establish substantive integration of biodiversity conservation as an objective to be furthered through the land use planning process. The success, or otherwise, of the RMPS and LUPAA in achieving this objective is a direct function of the broader policy settings and the specifics of the statutory instruments, as well as how well the varying legislation integrates. As demonstrated in this chapter, it is evident that a consistent policy framework across regulators is lacking and land use planning in particular is operating in a policy vacuum. Integration of biodiversity into land use planning remains inconsistent, both across and within regulators. There are also divergent views on how biodiversity should be incorporated into land use planning in Tasmania. Notwithstanding, the 2009 changes to FPS, followed by the declaration of interim scheme (90% of which include provisions relating to biodiversity conservation and now the move to a single Statewide planning scheme with a mandatory NAC) firmly establish the role of local government as statutory planning authorities as one of the key regulators of biodiversity in Tasmania and planning schemes as the central mechanism for achieving this. The NAC also establishes consistency in integration of biodiversity into the statutory planning process. However, this consistency is at the expense of enabling a level of local variation where supported by local policy and strategy (section 3.3.3).

In the following chapters I examine the integration of biodiversity conservation into statutory planning instruments in Tasmania in more detail, including the identification of relevant concepts of biodiversity (Chapter 4), the extent to which this biodiversity is subject to consideration (Chapter 5), how impacts on this biodiversity are determined (Chapter 6) and how decisions are made about what impacts are acceptable (Chapter 7). Throughout these chapters I examine where the processes and provisions provide for effective outcomes and where they break down; testing the perceptions of survey respondents and interviewees and evaluating the effectiveness of the interim schemes and the SPPs.

Chapter 4 - Concepts of biodiversity in theory

> Biological diversity' means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems (United Nations 1992b:3).

On a superficial level, biological diversity, or biodiversity, appears straightforward and uncontested as a concept. As Australia is a signatory to the Convention on Biological Diversity, the United Nations (1992b) definition is essentially enshrined in the Commonwealth of Australia's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) (Bates 2013). The term 'biodiversity' is also enshrined in legislation, policies, and strategies that sit beneath the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) (Natural Resource Management Ministerial Council 2010; State of New South Wales 2009; State of the Environment Committee 2011). Indeed 'biodiversity' appears to be so well accepted and understood that many policy and strategy documents use the term without providing a definition (Department of Environment and Primary Industries (Vic) 2015; Southern Tasmanian Councils Authority 2011; State of Queensland 2009).

Biodiversity, then, refers to all biological entities, 'which is an intimidating idea because it seems impossible to operationalize it' (Sarkar & Margules 2002:301). 'It is not even possible to enumerate all of the species of any one area, let alone the members of logical classes at lower levels such as populations and individuals. Yet this is biodiversity, and maintaining that complexity is the goal of conservation planning' (Margules & Pressey 2000:245). Operationalising the definition of biodiversity and applying it in the real world in order to make decisions about which living organisms are important to maintain and conserve, where and at what scale is integral to biodiversity conservation (Ives et al. 2010; Lewandowski, Noss & Parsons 2010; Sarkar & Margules 2002).

Articulating 'clear, holistic and workable concepts of biodiversity that are grounded in science' is central to the substantive integration of biodiversity into land use planning (Ives et al. 2010:249). Failure to clearly define biodiversity and classify planning elements 'may lead to a range of problems including double-counting and inappropriate trade-offs in decisions' (Wallace 2012:2). In addition to ensuring concepts of biodiversity are scientifically robust, they also need to be comprehensive and relatively straight forward to interpret (Preston 2013). If important concepts of biodiversity are not explicitly identified and clearly defined within the standards and provisions of statutory planning instruments, there is no head of power to consider those concepts as relevant matters in the exercise of powers and functions.

'The enormity and complexity of problems like … biodiversity loss has led to the development of indicator species and other surrogate approaches to track changes in environments and/or in biodiversity' (Lindenmayer, Barton & Pierson 2015:47). There are numerous frameworks for classifying biodiversity into different elements and associated surrogate measures (Ives et al. 2010; Sodhi & Ehrlich 2010; Westgate 2015). Unfortunately, there is no consensus on the best surrogates for particular purposes (Bradshaw & Brook 2010). Consequently there is no standardised national set of biodiversity indicators in Australia, with different states and territories using different indicators (Bradshaw & Brook 2010; Margules & Pressey 2000; State of the Environment Committee 2011).

In articulating and operationalising concepts of biodiversity, planners often divide surrogates into taxonomic and environmental categories (Grantham et al. 2010). Taxonomic surrogates are predominantly based on biological data, with species diversity, species rarity, species richness and species assemblages some of the most common measures (Grantham et al. 2010; Lindenmayer, Barton & Pierson 2015; Sarkar & Margules 2002). Environmental surrogates are usually based on a mix of physical (physiognomy) and biological or floristic data, which in turn can be subdivided into discrete classes, such as ecological classifications, vegetation communities or structural or pattern indices (Grantham et al. 2010; Mac Nally 1990). The categorisation into environmental and taxonomic surrogates provides a useful framework for exploring the different concepts of biodiversity articulated within planning schemes and by interviewees.

In this chapter, I aim to describe the variation in concepts of biodiversity that are expressly identified in statutory planning instruments in Tasmania and compare these to the concepts identified in the interview data. Next I examine how these concepts are translated into the operation of planning instruments and identify where these concepts are largely excluded from consideration due to failure to clearly identify concepts of biodiversity as relevant considerations.[16]

4.1 Identification of concepts under interim schemes

Concepts of biodiversity articulated within the codes in contemporary planning schemes specifically tasked with protecting biodiversity[17]are variable, with 59 separate biodiversity concepts mentioned across 29 planning schemes (Table 1, Appendix VIII). While the specific concepts in planning schemes varied, they broadly follow the categorisation proposed by Grantham et al. (2010), with most

[16] This chapter draws on the results of the content analysis of planning schemes (section 2.1.3), the semi-structured interviews (section 2.1.2) and the integrated analysis (section 2.1.5).

[17] Planning schemes with codes specifically tasked with protecting biodiversity or managing vegetation clearance and in effect at the time of analysis include 26 of the 28 interim planning schemes as well as the Flinders Island Planning Scheme 1994. The biodiversity type codes within the Northern and North West schemes also include consideration of riparian and coastal vegetation. In the Southern schemes, the protection of riparian and coastal vegetation is provided for in a separate code (the Waterway and Coastal Protection Code). In undertaking this analysis, the provisions in the Waterway and Coastal Protection Code relating to terrestrial biodiversity and vegetation have been included. While there are two interim schemes not containing codes specifically tasked with protecting biodiversity and therefore excluded from this analysis are the Central Highlands Interim Planning Scheme 2015 and the Derwent Valley Interim Planning Scheme 2015. One scheme, the Flinders Planning Scheme, is not an interim scheme. Therefore I use the term contemporary planning scheme rather than an interim planning scheme to refer to all schemes in effect at the time of analysis.

planning schemes including a combination of taxonomic surrogates and environmental surrogates (Table 1, Appendix VIII).

Environmental surrogates were the most frequently used surrogates in planning schemes, with 78% (n = 46) of concepts classified as environmental surrogates (Table 1, Appendix VIII). Of these environmental surrogates, 40% (n = 19) relate to habitat, 24% (n = 11) related to the importance of vegetation for ecological process and function, and 22% (n = 10) related to vegetation assemblages (Figure 4.1).

Taxonomic surrogates were less frequently identified in planning schemes (22%, n = 13) (Figure 4.1 and Table 1, Appendix VIII). They were predominantly concerned with the conservation of individual species and groups of species (n = 10 or 77%), with 60% of these pertaining to threatened species (n = 6) (Figure 4.1 and Table 1, Appendix VIII).

Explicitly naming and identifying these concepts is important as it establishes the scope and intent of biodiversity provisions. However, for statutory planning authorities to be able to have regard to these concepts or values in making land use planning decisions, these concepts need to be specified within the code provisions of the Scheme, as distinct from simply mentioned in objectives or purpose statements (section 3.3.2). There was a difference between concepts identified and concepts able to be considered ($F = 45.10_{1,90}$, $p < 0.001$). There were 388 mentions of concepts but only 277 (71%) were considered (n = 277 or 71.4%).

Fifty-one concepts of biodiversity were referred to by interviewees (Table 2, Appendix VIII). Fifty-three percent (n = 27) of concepts mentioned in interviews were environmental surrogates (Figure 4.1 and Table 1, Appendix VIII). Of these environmental surrogates, 30% (n = 8) related to habitat, 44% (n = 12) related to the importance of vegetation for ecological process and function, 26% (n = 7) related to vegetation assemblages and 2% (n = 1) pertained to other concepts of biodiversity (Figure 4.1 and Table 1, Appendix VIII).

Taxonomic surrogates were less frequently identified by interviewees (39%, n = 20) (Figure 4.1 and Table 1, Appendix II). The interviewees were concerned with the conservation of individual species or groups of species (n = 20 or 100% of taxonomic surrogates), with 70% of these pertaining to threatened species (n = 14) (Figure 4.1 and Table 1, Appendix VIII).

To understand variation in conceptualisation of biodiversity, Principle Components Analysis (PCA) of concepts of biodiversity identified in planning schemes was undertaken (section 2.1.5). The concepts identified in planning schemes can be explained by 4 principle components (PC) (95.1 %) (Figure 4.2). The first axis (PC1) explained 75.2% of the total variance. The variable with the strongest positive correlation with this axis was the total number of concepts mentioned (0.959). The second axis (PC2) explained a further 12% of the total variance and 87.1% of the cumulative variance when combined with PC1. The variables that have the strongest positive correlation with PC2 were native vegetation communities (0.240), important habitat for threatened species (0.228), ecological function (0.237), natural processes (0.230), high priority biodiversity values (0.250), moderate priority biodiversity values (0.219), low priority biodiversity values (0.240), other biodiversity values of local significance (0.250) and threatened fauna (0.227). The strongest negative correlations within PC2 related to native vegetation (-0.220), priority vegetation communities (-0.157), priority habitat (-0.157), condition (-0.157), habitat (-0.163), condition (-0.157), connectivity (-0.157), extent (-0.157), quality (-0.157) and wildlife corridors (-0.157), the number of species (-0.157) and species (-0.157).

The third axis (PC3) explained a further 6.5% of the total variance and 93.7% of the cumulative variance when combined with PC1 and PC2. The variables that had the strongest positive correlation with PC3 were priority habitat (0.113), priority vegetation (0.113) condition (0.113), connectivity (0.113), extent (0.113), quality (0.113), wildlife corridors (0.113) conservation status (0.108), number of species (0.113), species (0.113) and species diversity (0.110). The strongest negative associations within PC3 were endangered ecological communities (-0.272), threatened native vegetation communities (-0.238), habitat value (-0.298), threatened species (-0.196), threatened flora (0.196), threatened species habitat (-0.287), threatened fauna habitat (-0.288), ecological processes (-0.283), wildlife (-0.298) and number of concepts mentioned (-0.190).

The fourth principal component (PC4) explained a further 1.4% of the total variance and 95.1% of the cumulative variance when combined with PC1, PC2 and PC3. The variables that had the strongest positive correlation with PC4 were ecosystems (0.255), habitat (0.222), migratory species (actual or potential) (0.292), threatened species habitat (0.222), ecological processes (0.185), ecologically significant areas (0.255), genetic diversity (0.255), reservoirs of biodiversity (0.255) and threatened species (0.235). The strongest negative associations within PC4 were native vegetation (-0.225), priority vegetation (-0.149), threatened native vegetation communities (-0.219), other habitat for threatened species (-0.161) and riparian and coastal vegetation (-0.255).

There were four distinct groups of planning schemes based on the concepts identified, or mentioned, in planning schemes (Figure 4.1). This clustering corresponded largely with the regions (chi^2 = 51.8, df = 6, p = <0.001), which each had model interim planning schemes. Despite the high level of regional alignment, the cluster analysis also indicated there was some variations within regions, notably between the Southern interim planning schemes (which comprise Groups 2 and 4) (Figure 4.1).

Group 1 included all Northern interim planning schemes. Within this group there was limited variation, with all but one interim scheme in the North adopting the same concepts of biodiversity (Figure 4.1). Group 2 was comprised of Southern interim planning schemes, excluding the Derwent Valley and Central Highlands. There was considerable variation in the concepts mentioned across Group 2 (Figure 4.1). Group 3 included all North West interim planning schemes and the only northern planning scheme which is still a pre-interim scheme (Flinders Island). There was consistency between all of the North West interim schemes in terms of concepts of biodiversity. While the Flinders Island Planning Scheme differed from the North West interim schemes, it was more closely aligned with these schemes than those in the North or South. Group 4 was comprised of the Derwent Valley and Central Highlands interim planning schemes, which formed their own group as, unlike the other Southern interim schemes, these schemes did not include a biodiversity-related code. Consequently, the number and type of concepts of biodiversity within this group were very limited ($n = 3$).

Northern interim planning schemes (Group 1) were characterised by the highest total number of biodiversity concepts mentioned, with 18 different concepts identified in biodiversity-related codes (Table 4.1). In contrast, the two interim schemes without a biodiversity code (Group 4) only identified 2 concepts of biodiversity (Table 4.1). Southern interim planning schemes with biodiversity codes (Group 2) identified an average of 15 different concepts (Table 4.1), ranging from 11-20. This variation reflects the lack of an agreed set of concepts in the Southern regional model scheme, with each Southern local government area (LGA) having the discretion to determine the specific values to be included in the biodiversity or equivalent code. Group 3 (North West and Flinders schemes) identified an average of 11 concepts of biodiversity, with the North West schemes in this group achieving 100% consistency in both number and description of concepts (Table 4.1). The number of concepts differed significantly between groups ($F = 45.10_{3,28}$, $p < 0.001$).

Table 4.1 Group averages for the number of concepts mentioned and percentages for the presence/absence of concepts (bold indicates highest value for the variable)

Concept of biodiversity mentioned	Group 1 (North) (7)	Group 2 (South 1) (10)	Group 3 (North West & Flinders) (10)	Group 4 (South 2) (2)
Number of concepts mentioned	**18a**	14.8b	11c	2d
Habitat	**85.7**	0	10	0
Critical habitats	**85.7**	0	0	0
Priority habitat	**100**	0	0	0
Bioregionally threatened community	**85.7**	10	0	0
Vegetation communities	**85.7**	0	0	0
Priority vegetation communities	**100**	**100**	0	0
Condition	**100**	0	0	0
Connectivity	**100**	0	0	0
Extent	**100**	0	0	0
Quality	**100**	0	0	0
Wildlife corridor	**100**	0	0	0
Species diversity	**85.7**	0	0	0
Conservation status	**100**	40	0	0
Number of threatened species	**100**	0	0	0
Species	**100**	0	0	0
Threatened species	**100**	20	**100**	0
Native vegetation	**100**	10	90	0
Threatened species habitat	0	10	**100**	0
Ecological processes	0	0	**100**	0
Threatened fauna habitat	0	10	**90**	0
Habitat value	0	0	**90**	0
Wildlife	0	0	**90**	0
EPBCA listed communities	0	**100**	90	0
Threatened native vegetation communities	14	**100**	90	0
Threatened flora	0	80	**90**	0
Important habitat for threatened species	14	**90**	0	0
Threatened fauna	0	**90**	0	0
Moderate priority biodiversity values	0	**80**	0	0
Native vegetation communities	0	**90**	0	0
High priority biodiversity values	0	**100**	0	0
Other biodiversity values of local significance	0	**100**	0	0
Low priority biodiversity values	0	**90**	0	0
Other habitat for threatened species	0	**40**	0	0
Ecological function	0	**100**	0	**100**
Natural processes	0	**100**	10	**100**

Source: Integrated analysis of planning schemes conducted in 2017-2018.

4.1.1 Habitat

Concepts relating to the protection and conservation of habitat were identified in 93% (n = 27) of planning schemes, the exception being those schemes in the South which did not incorporate a biodiversity or equivalent code (Group 4). The most frequent concepts were threatened species habitat (n = 11, 37.9%), threatened fauna habitat (n = 10, 34.5%), important habitat for threatened species (n = 10, 34.5%), habitat value (n = 9, 31%), priority habitat (n = 7, 24.1%), habitat (n = 7, 24.1%) and critical habitats (n = 6, 20.7%) (Figure 4.3 and Table 1, Appendix VIII).

Biodiversity concepts characteristic of the North (Group 1) pertaining to habitat included habitat (n = 6, 85.7%), critical habitats (n = 6, 85.7%) and priority habitat (n = 7, 100%) (Table 4.1 and Figure 4.3). Southern schemes in Group 2 identified the largest total number of concepts pertaining to habitat (n = 14) (Figure 4.3). The concepts of habitat characteristic of this group were principally concerned with threatened species habitat, including important habitat for threatened species (n = 9, 90%) and other habitat for threatened species (n = 4, 40%) (Table 4.1 and Figure 4.3).

Other variations on the concept of threatened species habitat adopted by the Southern interim schemes in Group 2 were planning scheme specific, and included: highly significant actual or potential habitat for threatened species; known or potential habitat for threatened species; moderately significant actual or potential habitat for threatened species; potential habitat for threatened species; significant habitat for threatened species; and, priority vegetation, which incorporates but is not restricted to native vegetation which provides habitat for a threatened fauna species (Figure 4.3). Only three Southern planning schemes in Group 2 identified concepts of habitat not specific to threatened species habitat, with one scheme identifying habitat for migratory species and other fauna habitat as important, one identifying hollow dwelling habitat and one identifying high conservation value trees (Figure 4.3).

Concepts of biodiversity characteristic of the North West and Flinders planning schemes (Group 3) pertaining to habitat included threatened species habitat (n = 10, 100%), threatened fauna habitat (n = 9, 90%) and the habitat value of native vegetation (n = 9, 90%) (Table 4.1 and Figure 4.3). Flinders Island Planning Scheme also identified migratory species habitat and habitat generally as being of importance (Figure 4.3). The two Southern interim schemes without a biodiversity-type code (Group 4) did not identify any biodiversity concepts relating to habitat.

Habitat as an important surrogate for biodiversity was also highlighted in the interview data, with 78% (n = 28) of interviewees making references to habitat (Table 2, Appendix VIII). While only one planning scheme identified individual trees as a relevant concept of biodiversity, individual trees were the second most frequently referenced concept in the interviews (n = 12, 33%) (Table 2, Appendix VIII). References to individual trees were made by interviewees across a range of roles and areas of expertise, at both levels of government and non- government, across all regions, by those with a direct and indirect role in regulation and across rural and urban LGAs. Comments relating to trees were predominantly made by interviewees within local government (*n* = 9), larger (*n* = 7), peri-urban (*n* = 6) LGAs and by those with an indirect role in regulation (*n* = 10). The only groups to not make specific reference to individual trees were consultant planners and ecological consultants.

Of the comments pertaining to individual trees, 25% (*n* = 3) of the views expressed related to the impracticalities of regulating and maintaining individual mature trees, particularly in urban contexts.

> We ended up having to take applications, being forced to take applications for the one gum tree left from the original subdivision in the 1960's because the neighbours had a dispute because they wanted it kept… you end up with the situation where they've got a report to say it's unsafe and has to come out because that's what they do because it's the easiest way for them, and you have to go through a discretionary planning application for what purpose? It will be removed. You won't say no, because if you say no and something happens, you're liable (Statutory Planner 1 2015).

The perceived impracticalities of assessing individual tree removal may be one of the reasons only one planning scheme included provisions relating to individual trees. Notwithstanding the potential impracticalities, of those interviewees referring to trees, 66.6% (*n* = 8) expressed the view that the loss of individual trees, even if inevitable, should still be considered and accounted for.

> Even with the strongest controls in place we're going to see that [problem trees that seem to be unsafe in urban areas or just very small incremental losses]. But if we can have some system in place to try and compensate for that, that's fine (NGO Expert 3 2015).

Threatened species habitat more broadly was referred to by 22% of interviewees (*n* = 8). Of these interviewees referring to habitat, over 60% (*n* = 5) commented on gaps in the *Threatened Species Protection Act 1995* (TSPA) in considering habitat and the reliance on other regulators.

> The whole thing of knowingly taking is just, I mean the bar's so low you can never prove it... It entirely misses habitat, we have no powers over habitat … I mean the only power we have is by advising Councils and the EPA who can actually put it into, but it's entirely up to them to take that advice or not (State Expert 5 2015).

> If there is habitat for a particular species, that has the same value as the species. Whereas I don't think it works like that in Tassie (Ecological Consultant 4 2015).

Of these comments, 80% (*n* = 4) were made by those with a direct role in regulation and 60% (*n* = 3) from within State Government. One key gap in the TSPA identified by those with a direct role in regulation specifically (100%, *n* = 3) was the failure to declare any critical habitat (section 3.1.1).

> There's also this concept of the critical habitat and that was obviously done really to allow for managing around habitat because you don't know where every single one is, but it's never worked and that means that it is not nearly as effective as it should be because you don't always know the species is there, and if you really want to push things you can just say, 'Well the species wasn't there when I did whatever it was' (State Expert 3 2015).

> There are a lot of flaws with the Act in terms of how it's enforced. Several parts of the Act have never been called upon like, interim protection orders or making – what was the other key one? Areas of critical habitat have never been called upon, they were going down there once about 10-years ago and were told in no uncertain terms, 'Stay out of there' (State Expert 8 2015).
>
> We've got good legislation around direct impact on species, but very little on habitat, and I don't think there have been any critical habitats listed (Environmental Planner 2 2015).

One of the main barriers to declaration of critical habitat identified by interviewees was the compensation requirements under s45 of the TSPA.

> This one with critical habitat, they would've liked to have named the area as critical habitat… because it absolutely qualified… I know one of the reasons we just wouldn't go down that path was because of the compensation consequences (State Expert 3 2015).

In the absence of declarations of critical habitat, there is a total reliance on regulation outside the TSPA to protect and conserve habitat for threatened species. Consequently, the provisions in planning schemes are vital in ensuring consideration of threatened species habitat in land use planning decisions. However, only 37.9% (n = 11) of planning schemes mentioned threatened species habitat and only 34.5% (n = 10) enable consideration of threatened species habitat (Table 1, Appendix VIII). Of the 20.7% (n = 6), schemes that mentioned critical habitat none of them provided explicit consideration for this habitat, as the term was not defined and was not specified in the provisions of the code.

Furthermore, although 93% (n = 27) of planning schemes aimed to protect and conserve threatened species habitat, only 10% (n = 3) of these included definitions for only 15% (n = 4) of the concepts of habitat, notably:

> *habitat for threatened species,* which is defined in the Glenorchy Interim Planning Scheme 2015 as described in either of the following:
>
> (a) in that species' SPRAT Profile in the Species Profile and Threats Database of the Australian Government Department of the Environment;
>
> (b) in that species' recovery plans made under the Tasmanian *Threatened Species Protection Act 1995* and/or approved under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*;
>
> *potential habitat*, which is defined in the Kingborough Interim Planning Scheme 2015 as 'all habitat types within the potential range of a threatened flora or fauna species that are likely to support that species in the short and/or long term. It may not include habitats known to be occupied intermittently. Potential habitat is determined from published and unpublished scientific literature and/or via expert opinion, is agreed by the Threatened Species Section (Department of Primary Industries, Parks, Water and Environment) (DPIPWE) in

consultation with species specialists, and endorsed by the Scientific Advisory Committee under the *Threatened Species Protection Act 1995'*.

priority habitat, which is defined in the Northern interim planning schemes as 'the areas shown as priority habitat on the planning scheme overlay maps'.

significant habitat, which is defined in the Kingborough Interim Planning Scheme 2015 as 'native vegetation determined from published scientific literature and/or agreed by the Threatened Species Section (DPIPWE) in consultation with species specialists, and/or endorsed by the Threatened Species Scientific Advisory Committee as habitat within the known range of a threatened or vulnerable flora or fauna species that:

(i) is known to be of high priority for the maintenance of breeding populations throughout the species' range; and/or

(ii) if converted to non-native vegetation is considered to result in a long term negative impact on breeding populations of the species.

It may include areas that do not currently support breeding populations of the species but that need to be maintained to ensure the long-term future of the species.

With the exception of the term priority habitat, the definitions were derived from accepted documentation and sources. In the case of the definition of habitat for threatened species adopted in the Glenorchy Interim Planning Scheme 2015, this definition was based on Australian Government database or recovery plans. In the case of the definitions of potential and significant habitat adopted in the Kingborough Interim Planning Scheme 2015 the definitions were derived from habitat descriptions developed and adopted by the Forest Practices Authority (FPA) and agreed by DPIPWE (Forest Practices Authority & Threatened Species Section DPIPWE 2012).

While undefined within the planning schemes, the term critical habitat was used by the Northern interim planning schemes. This term is defined in the TSPA as 'an area of land defined on a map under s23 which the Secretary determines as a critical habitat of a listed taxon of flora or fauna'. In the absence of a definition in planning schemes, it is not unreasonable to assume the definition of the term articulated in the TSPA should be applied. The key issue here is that, while the TSPA defines critical habitat and provides for the identification and declaration of such habitat, to date no areas in Tasmania have been identified as critical habitat (section 3.1.1). Consequently, it could be argued that the term also has no application via planning schemes. The variation in and lack of workable definitions of habitat is reflective of the broader policy vacuum, which creates uncertainty not just around whose role it is to regulate impacts on threatened species habitat but what it is we should be regulating. In the absence of agreed definitions of what constitutes habitat, the ability to maintain this habitat and the species it supports through planning schemes is severely compromised.

Old growth and mature forest were identified by 13.9% (*n* = 5) of interviewees, all of whom had a direct regulatory role.

> The other thing that we don't do very well is management of mature forest. So we have some provisions in the code to take into account or to maintain maturity and take into account mature forest values, both flora and fauna, but there's been enough studies to date, I think, that suggests that we could do things better in that area (State Expert 2 2015).

The limited consideration of mature habitat was also reflected in planning schemes, with only 10% (*n* = 3) of schemes including concepts relating to mature habitat (Table 1, Appendix VIII). Therefore the perceived gaps in consideration of individual trees, threatened species habitat and mature habitat identified in the interviews were reflective of the gaps in statutory planning instruments.

4.1.2 Vegetation assemblages

Concepts of biodiversity relating to native vegetation and vegetation assemblages were identified in 93.1% (*n* = 27) planning schemes, including all interim schemes in the North (Group 1), all Southern schemes with biodiversity-type codes (Group 2) and all North West schemes and Flinders (Group 3) (Figure 4.4). The most frequently referenced concept was threatened native vegetation communities (*n* = 20) (Table 4.1, Figure 4.4).

Concepts pertaining to vegetation assemblages characteristic of interim schemes in the North (Group 1) included native vegetation (100%, *n* = 7), vegetation communities (*n* = 6, 85.7%) and bioregionally threatened communities (*n* = 6, 85.7%) (Table 4.1 and Figure 4.4). Identification of native vegetation and vegetation communities provided the potential for Northern interim schemes to consider impacts arising from the loss of native vegetation more broadly, not just State listed communities and the habitat of listed species. Recognition of the conservation status of vegetation communities at the bioregional scale was also characteristic of the Northern interim schemes, with 87.5% (*n* = 6) of schemes specifically recognising native vegetation communities which may be threatened at a bioregional scale. The Northern interim schemes did not specifically refer to threatened vegetation communities but rather refer to priority vegetation communities. Based on the definition in the Launceston Interim Planning Scheme 2013, the concept of priority vegetation communities as used in the Northern interim schemes was synonymous with threatened vegetation communities and threatened species habitat. However it is unclear from the definition whether the reference to threatened vegetation communities was intended to include or exclude communities listed only under the EPBCA, such as lowland native grassland.

Concepts pertaining to vegetation assemblages characteristic of Southern schemes in Group 2 included threatened native vegetation communities (*n* = 10, 100%), encompassing communities listed under the *Nature Conservation Act 2002* (NCA) and EPBCA, and native vegetation communities (*n* = 9, 90%) (Table 4.1 and Figure 4.4). Recognition of the conservation status of vegetation communities at the bioregional scale was limited in this Group, with only one Southern interim specifically recognising more widespread native vegetation communities threatened at a bioregional scale (Table 4.1). As with the Northern interim schemes (Group 1), identification of native vegetation communities generally and not just listed communities indicates most Southern interim schemes with biodiversity-related codes intended to consider impacts arising from the loss of native vegetation more broadly.

Concepts relating to vegetation assemblages characteristic of the North West and Flinders planning schemes (Group 3) included native vegetation (*n* = 9, 90%), threatened native vegetation communities (*n* = 9, 90%) and EPBCA listed communities (*n* = 9, 90%) (Table 4.1 and Figure 4.4). In their definition of threatened native vegetation communities, the North West schemes (Group 1 excluding Flinders) only specified communities listed as threatened under the NCA and did not include communities listed under the EPBCA. The two Southern interim schemes without biodiversity-type code (Group 4) did not identify any biodiversity concepts relating to vegetation assemblages.

The most frequent environmental surrogates referred to in the interviews related to vegetation communities, with 86% (*n* = 31) of respondents making statements pertaining to vegetation communities and 83% (*n* = 30) of these referring to threatened native vegetation communities specifically. Of those comments, 17% (*n* = 6) highlighted the perception that current regulations focus on the status of vegetation and preclude consideration of non-threatened vegetation.

> The problem with the whole assessment process is it's all based around this statutory vegetation stuff, and it's based around what's listed… to actually maintain this bank of urban vegetation is actually nearly impossible to do properly while the focus is still on threatened and listed (NRM 3 2015).

> I think that's one of the problems is that everything seems focused on these top-level values. You know your threatened species and threatened communities and everything else is just sort of deemed to be of not that much value, and therefore it can go (Environmental Planner 2 2015)

> There are no conditions for a bit of DOB which is infinitely better than a bit of DAS. You know, you might have to go through a whole bunch of stuff [for the DAS), whereas you can just clear that [the DOB] … just because of how it's classified (Ecological Consultant 1 2015).

> 5 hectares of grasslands are going to be cleared, but there's no discussion about that. It's almost like it's not on the radar. There's no protection for that grassland because it's not a listed community, it doesn't qualify for an EPBCA community, there's no threatened flora species listed under the Act. So in essence there's no protection for that... and that's a gap (Ecological Consultant 4 2015).

> I think one thing that it's so hard to regulate but if you only look after the special things then suddenly everything else can become threatened as well (NRM 2 2015).

> I think that's one of the problems is that everything seems focused on these top-level values. You know your threatened species and threatened communities and everything else is just sort of deemed to be of not that much value, and therefore it can go (Environmental Planner 2 2015).

A related issue identified by some interviewees was whether the list of threatened communities is comprehensive and therefore achieving its intended purpose. As one interviewee stated.

> The schedule of State listed threatened vegetation communities are primarily forest based ones, because they were driven by the regional forest agreement… it's not a comprehensive list of potentially, or in reality all threatened communities in this state (Consultant Planner 1 2015).

For example, remnant lowland native grasslands are regarded as one of Tasmania's most threatened and fragmented ecosystems (Department of Primary Industries Water and Environment 1999; Kirkpatrick, Gilfedder & Fensham 1988; Kirkpatrick, McDougall & Hyde 1995; Threatened Species Scientific Committee (Tas) 2008). However, despite being listed as critically endangered under the EPBCA, to date lowland native grasslands have not been listed as a threatened vegetation community under the NCA. 'Even though grasslands are protected or considered endangered at the national level, there still hasn't been a commitment from the State level to change and get them on the list' (State Expert 8 2015).

Other comments highlighted the importance of considering disturbance to and the condition of understorey vegetation when assessing the importance of vegetation assemblages for biodiversity (8.3%, n = 3).

> It's the understorey I'm really worried about because once that understorey is disturbed sufficiently then you've lost the whole thing, and all the micro-flora and fauna is gone, so all the ability for the vegetation to regenerate you've lost it (NRM 3 2015).

These comments regarding the importance of non-listed vegetation and understorey vegetation had an association with roles, with all environmental planners and 50% of ecological consultants referring to the importance of non-priority vegetation and references to understorey vegetation only being made by strategic planners and people in a natural resource management (NRM) role.

The perception that current planning schemes were predominantly focussed on threatened native vegetation communities and did not enable consideration of non-listed vegetation was not necessarily supported by analysis of planning schemes. As demonstrated above, 90% (n = 26) of contemporary schemes identify native vegetation broadly as important to conserve and 86% (n = 25) included specific provisions enabling consideration of native vegetation communities other than listed communities. Therefore, the perceived lack of consideration for non-listed communities does not reflect the planning schemes, and the existence of provisions pertaining to non-listed vegetation does not necessarily translate into due consideration for this vegetation (section 5.2).

4.1.3 Process and function

Concepts relating to ecological process and function may be considered indirect rather than direct surrogates for biodiversity. According to Pressey et al. (2007:583), 'there are two reasons for considering ecological processes in conservation planning. First, most of our depictions of biodiversity are snapshots which become outdated as species distributions change and categories of land, sea and freshwater blur and shift. Second, biodiversity is generated and maintained by processes and, unless we plan for them specifically, many processes will be disrupted or cease altogether'. Functional diversity is also important as functionally diverse communities are resilient against stress or shock and are less likely to change their behaviour (Folke et al., 1996; Nunes and van den Bergh, 2001).

Riparian and coastal vegetation were identified as being of importance for their role in maintaining ecological processes and water quality in all but one planning scheme (n = 28, 96.6%) (Figure 4.5). According to Knight and Cullen (2010b:15), riparian vegetation has been found to have consistently high biodiversity values relative to its extent and therefore contributes disproportionately to landscape function. The value of riparian and coastal vegetation is also multi-faceted, providing protection for terrestrial biodiversity, land and soils resources, and freshwater and marine ecosystems (Knight & Cullen 2010b). Natural processes and ecological function were identified in Southern interim schemes (Groups 2 and 4). Biodiversity concepts relating to ecological process and function characteristic of the Northern interim schemes (Group 1) included condition, connectivity, extent, quality and wildlife corridors (Figure 4.5 and Table 4.1) (100%). These concepts (n = 5) were specific to the Northern interim schemes (n = 7, 24%) and were not mentioned in other schemes (n = 22, 76%).

In addition to riparian and coastal vegetation, concepts relating to process and function characteristic of Southern interim schemes (Group 2 and Group 4) included natural processes (100%) and ecological function (100%). Other concepts of process and function identified by the Southern interim schemes in Group 2 were derived from Knight and Cullen (2009:42) and were specific to the Kingborough and Huon Valley interim schemes respectively, including: clearing bias, which 'addresses whether the preferential clearing of certain types of land in a region has a disproportionate impact on biodiversity' (Knight & Cullen 2009:24); less than 30% native vegetation within 1 km, which is considered to be the minimum acceptable threshold for clearing bias and therefore 'a functioning landscape' capable of providing some ecosystem services and moderate biodiversity protection at the landscape scale (Knight & Cullen 2009); and, remnant vegetation (Figure 4.4 and Table 4.1). According to Knight and Cullen (2009:42),

> Remnant vegetation is defined as islands of native vegetation, below a specified size, that are surrounded by cleared land. Remnant vegetation has been identified as being of critical importance to landscape function and … is directly related to the issues of native vegetation clearing bias, condition, tree decline, riparian vegetation, connectivity, salinity and erosion'.

The only process and function concept characteristic of the North West and Flinders schemes (Group 3) was ecological processes (100%) (Figure 4.4 and Table 4.1). Furthermore, it is only the North West and Flinders Schemes (Group 3) which specifically identified ecological processes, one of the main objectives of the Resource Management and Planning System (RMPS). Therefore, while all planning schemes include concepts relating to the importance of maintaining process and function for biodiversity, with the exception of riparian and coastal vegetation, the scope of the concepts identified is limited and ad hoc.

Just as all planning schemes identified concepts pertaining to landscape function, a large percentage of interviewees made statements relating to process and function (n = 25, 71%). However in contrast to planning schemes, only 14% (n = 5) pertained to riparian vegetation and 11% (n = 4) pertained to coastal vegetation. There was a significant relationship between statements regarding riparian values and region, with 80% of statements from interviewees based in the North.

Conversely, while Northern interim schemes (Group 1) were the only ones to reference connectivity and corridors, statements relating to these concepts were made by 39% of interviewees (n = 14) across all regions except the North West. Connectivity was also referred to by interviewees in all areas of expertise and in all roles, with the exceptions of statutory planners and ecological consultants. The references to connectivity and corridors in interviews indicate the acceptance of these concepts as relevant by many interviewees, despite their limited inclusion in planning schemes.

> Fragmentation is a key issue and connectivity is important (NGO Expert 2 2015).

> I think protecting corridors of vegetation is clearly going to help (State Expert 7 2015).

> Connectivity is something that we comment on when we are providing advice to regulators in term of loss of threatened vegetation community stuff, if that particular loss will fragment two populations. There are no legislative triggers to specify that, but that's something we feel pretty comfortable commenting on (State Expert 4 2015).

> I also think a Biodiversity Code needs to be able to look at that landscape or inform that landscape level... I'm thinking in terms of looking at those patches in terms of connectivity and fragmentation and where we do and don't want development to break up those important corridors (NRM 2 2015).

While only mentioned in one planning scheme, remnant vegetation was also identified as a relevant biodiversity concept by interviewees (n = 10, 28%) across all areas of expertise and at all levels of government and within non-government organisations (NGOs). These comments identified the challenges of managing remnants, particularly in urban contexts where the vegetation is often in poor condition, the threats are high and outcomes have the potential to be perverse.

> We have many parts of the landscape, predominantly on private land, that are heavily degraded with biodiversity remaining in remnants and we're probably running out of time to try to recover those landscapes (NGO Expert 3 2015).

> To actually maintain this bank of urban vegetation is nearly impossible to do properly while the focus is still on threatened and listed… This is a wonderful patch of remnant vegetation it's a nice little patch stuck in the middle of suburbia here, but doesn't have any listed stuff on it, so let's not get excited about it. Let's allow us to clear it (NRM 3 2015).

> So you've got a little patch of bush in the middle of, or very close to an area of urban development, then you've really got to ask yourself, 'How are we going to manage that? Is it really the place to be managing conservation?' And if it's something like, for example, a patch of blue gum or black gum, and one of your motivations is to protect it the habitat for swift parrots, and then you end up having it in an island in an area of development where you actually could be argued you're attracting a bird into an area where it's at risk from other forces of mortality like bird strikes, I know that's something where large trees in urban situations, they're probably not the best place to be protecting those things (Ecological Consultant 2 2015).

Research has demonstrated the major role that urban and ex-urban remnants have in biodiversity conservation, both in terms of threatened species (Ives et al. 2016; Kirkpatrick & Gilfedder 1995) but also in relation to ecosystem services (Adam 2009) (section 5.2.3). Notwithstanding, the view that maintaining urban remnants is impractical evidently persists and is perhaps one of the reasons for the lack of inclusion of remnants as a relevant concept in planning schemes.

While other concepts pertaining to landscape function were included in planning schemes, there was a difference between the identification of these concepts and the consideration of these concepts. Within the Northern interim schemes (Group 1), there was a difference in relation to condition and connectivity, which were mentioned in purpose statements but not included in the provisions. In the Southern interim schemes (Group 2 and Group 4), ecological function and natural processes were mentioned in objectives but not able to be explicitly considered within the provisions. Similarly within the North West and Flinders schemes, ecological processes were mentioned but not considered. Therefore, while contemporary planning schemes appear to take into consideration the process and function roles of native vegetation, the extent to which they provided for these outcomes was limited.

4.1.4 Species and species diversity

Taxonomic surrogates were identified in all planning schemes in Groups 1-3 (n = 27, 96%). Threatened species were evidently the most frequently mentioned taxonomic surrogate (Figure 4.6 and Table 1, Appendix VIII). Conserving threatened species is a well-accepted objective of biodiversity conservation and is enshrined in legislation at the national and State levels. Threatened species as surrogates for biodiversity have been favoured traditionally 'because species loss is relatively easy to observe, evokes emotional responses in people and allows management actions to be easily monitored and evaluated for effectiveness' (Ives et al. 2010:255). While threatened species is an accepted taxonomic surrogate, there was variation between groups in relation to specific threatened species concepts identified (Table 4.1).

All North interim schemes (Group 1) and all North West and Flinders planning schemes (Group 3) identified protection of threatened species (n = 10, 100%) (Figure 4.6 and Table 4.1). While the Southern interim schemes in Group 2 did not specifically refer to threatened species, 90% (n = 9) of these schemes identified threatened fauna and 80% (n = 8) identified threatened flora as taxonomic surrogates (Figure 4.6 and Table 4.1). Threatened flora and threatened fauna as taxonomic surrogates were also characteristic of Group 3 (n = 9) (Figure 4.6 and Table 4.1). Northern interim schemes (Group 1) did not specifically refer to threatened flora but they did acknowledge the need to consider the conservation and number of threatened species (n = 7, 100%) (Figure 4.6).

Other taxonomic surrogates not relating the threatened species and characteristic of the Northern interim schemes (Group 1) included species diversity (n = 6, 85.7%), the conservation status of species (n = 7, 100%) and species as a whole (n = 7, 100%) (Figure 4.6 and Table 4.1). In addition to surrogates relating to threatened species, the North West schemes in Group 3 also identified protection and conservation of wildlife (n = 9, 90%) (Figure 4.6 and Table 4.1).

Two (13%) Southern schemes identified priority species as surrogates, with one scheme listing species of significance (Huon Valley Interim Planning Scheme 2015) and the other providing consideration for other priority species of conservation significance (Kingborough Interim Planning Scheme 2015) (Figure 4.6). However neither scheme specified the species or the reasons for significance.

The importance of threatened species as a surrogate for biodiversity was also reflected in the interview data with 94% (n = 34) of interviewees making reference to threatened species (Table 2, Appendix VIII). When viewed by region, these responses mirrored the inclusion of threatened species in planning schemes, with all interviewees from the North West and North making statements regarding threatened species, and 82% of interviewees from the South making such references. References to threatened species were also made by interviewees across all areas of expertise (planning, biodiversity and NRM), by those within State and local government as well as those outside of government, and irrespective of whether the interviewee's role was a direct statutory role, a direct role in biodiversity regulation or an indirect role in biodiversity regulation. The high percentage of interviewees referring to threatened species suggests a broad acceptance of the relevance of land use planning in conserving threatened species, rather than relying solely on threatened species legislation.

> Unless you're a Level 2 development, and you're going through the EPA, there's nothing, these other things are almost self-assessing. There's no one going out there saying, 'You've impacted

> on a threatened species, you've triggered the Threatened Species Act, therefore you need to do something about it'… it's the same with the EPBCA, it's completely self-referral. And so that creates a weakness and I think if we didn't have Council, a process at Council level, then a lot of things would never be addressed (Ecological Consultant 2 2015).

Not all interviewees shared the view that threatened species are a relevant surrogate for inclusion in planning schemes, with one interviewee expressing the view that planning schemes are not the appropriate instrument to address impacts on threatened species as this is the purpose of threatened species legislation.

> Our view is we can't substitute for the legislation by putting a set of considerations into the planning scheme because: (a) we don't believe we have got the jurisdiction to do that; (b) we haven't got the knowledge or resource to do that; and, (c) we don't want to rely on our local politicians to make those sorts of decisions in the face of losing a development (Manager Planning 4 2015).

The difference in views on threatened species as a relevant surrogate in land use planning is symptomatic of the ambiguities in biodiversity regulation in the absence of State Policy or legislative change clearly articulating the role of land use planning and statutory planning schemes.

While protection of threatened species was mentioned in 69% (n = 20) of planning schemes, only 45% (n = 13) specifically identified threatened species as relevant matters for consideration within the scheme standards. Variation between threatened species as a concept and threatened species as a relevant consideration was most stark in the Northern interim schemes (Group 1), where all schemes mention threatened species protection as an objective but no Northern interim schemes included threatened species as an explicit consideration in decision making. Only 30% (n = 3) of Southern interim schemes in Group 2 included objectives or standards pertaining to threatened species. In contrast, all North West schemes included threatened species protection as an objective and included standards relating enabling consideration of threatened species.

One explanation for the apparent inconsistency between routine identification of threatened species protection as an objective and the limited inclusion of standards pertaining to threatened species may be the use of environmental surrogates such as habitat and ecosystems to achieve the objectives rather than the protection of the individual threatened species. According to Ives et al. (2010:255), individual threatened species are of 'limited use as biodiversity surrogates and a single-species focus can bias conservation action towards well-studied, charismatic species while neglecting cryptic species or indeed the entire ecosystems they comprise. This is of particular concern considering many species (especially invertebrates) are unknown to science and therefore have not had their conservation status assessed'.

The other reason there may be a difference between inclusion of threatened species as an objective and the inclusion of standards is the perception that other legislation is tasked with regulating impacts on threatened species and to some extent their habitat, notably the TSPA and the EPBCA. Therefore there is no need or role for a planning scheme to protect threatened species.

> So put the responsibility where parliament has brought it to rest. Make that agency accountable for its actions… it's not the responsibility of a planning scheme to pick that up and say we will do it for you… The decision rests with those who are responsible (Manager Planning 4 2015).

However, given the applicability of the TSPA is limited to 'knowingly taking a species' (section 3.1.1), and the EPBCA is restricted to self-referral of significant impacts on nationally listed species or communities, in the absence of planning scheme provisions identifying threatened species as relevant matters for consideration, there is a regulatory gap. Inclusion of specific standards pertaining to threatened species and their habitat establishes the ability to require a survey to determine the likelihood of their presence, consideration of the impacts of the proposal and whether these impacts could be avoided, minimised or mitigated, prior to proceeding to the stage of directly destroying or taking the species. Therefore in terms of achieving substantive outcomes for threatened species, identification of threatened species as a relevant consideration in planning schemes is essential to identifying threatened species issues early in the decision-making process and potentially avoiding impacts and therefore the need for permits under State and Commonwealth legislation.

4.1.5 Other surrogates for biodiversity

Other concepts of biodiversity were mentioned in 13% (n = 6) of schemes, notably in the South (Figure 4.1 and Table 1, Appendix VIII). The Southern interim schemes with biodiversity-related codes (Group 2) included a number of concepts specific to their schemes, including high priority biodiversity values (100%, n = 10), moderate priority biodiversity values (80%, n = 8) and low priority biodiversity values (90%, n = 9) and values of local significance (100%, n = 10) (Figure 4.1 and Table 4.1). These other concepts of biodiversity appear to be umbrella categories for other surrogates used and provided a mechanism for prioritising the relative importance of the concepts. An example of a high priority biodiversity value identified in all schemes in Group 2 was threatened native vegetation communities. Other high priority values included variations on habitat for threatened species (section 4.1.1). Moderate priority values included concepts like potential habitat for threatened species and role of native vegetation in maintaining ecological processes and function. Native vegetation communities which are not listed as threatened and do not provide habitat for threatened species were an example of low priority biodiversity values. Values of local significance was also an umbrella term used for any of the concepts identified in the Southern interim schemes which were not based on the State or Commonwealth status of vegetation communities or species. These concepts were identified as moderate or low priorities. Examples include bioregionally threatened vegetation communities, non-threatened native vegetation remnant vegetation and clearing bias (section 4.1.3).

Interviewees also identified the importance of local or community values as a concept of biodiversity (*n* = 13, 37%), in recognition that 'it is reasonable for Councils, municipalities, to have their own set of 'values' for things that might be important at the municipal scale which may be different because there may be different things that are rare, important, or significant in the municipal space' (State Expert 4 2015).

4.2 Identification of concepts in the Tasmanian Planning Scheme

Under the Tasmanian Planning Scheme (TPS), all schemes will be required to incorporate the Natural Assets Code (NAC) contained within the State Planning Provisions (SPPs) (section 3.3.3). The NAC adopts the concept of priority vegetation as a surrogate for biodiversity. Priority vegetation is defined as 'native vegetation where any of the following apply:

(a) it forms an integral part of a threatened native vegetation community as prescribed under Schedule 3A of the NCA;

(b) is a threatened flora species;

(c) it forms a significant habitat for a threatened fauna species; or,

(d) it has been identified as native vegetation of local importance' (Tasmanian Government 2018).

In addition, the NAC also provides consideration of riparian and coastal vegetation in a manner similar to that provided under the Southern interim schemes. It is evident from this definition that the scope of biodiversity concepts able to be considered under the provisions of the NAC is potentially broader for at least some (34%, *n* = 10) LGAs, as consideration is extended beyond listed communities to include threatened flora species and threatened fauna habitat.

While the NAC provides consideration for native vegetation which forms a significant habitat for a fauna threatened species, no definition of significant habitat is provided. Similarly, no parameters are provided for native vegetation of local importance. In the absence of these parameters, all LGAs have adopted concepts of biodiversity derived from a Regional Ecosystem Model (REM) developed by Natural Resource Planning (NRP) as surrogates for local values (Knight & Cullen 2012). These concepts include potential threatened species habitat, the relative reservation status of vegetation communities at a bioregional scale, the rarity of vegetation communities at a bioregional scale and remnant vegetation.

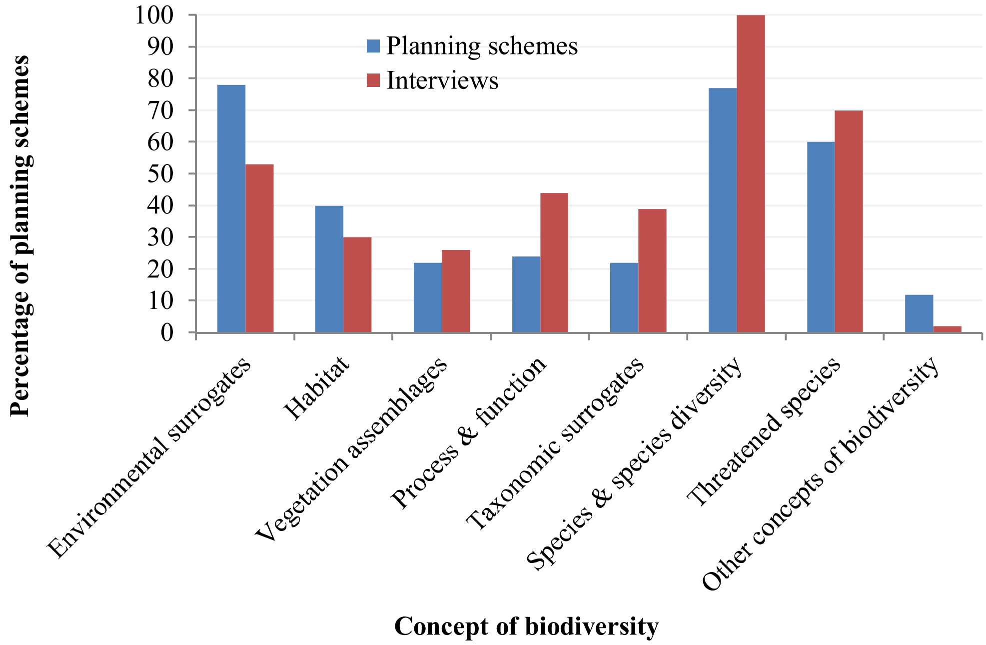
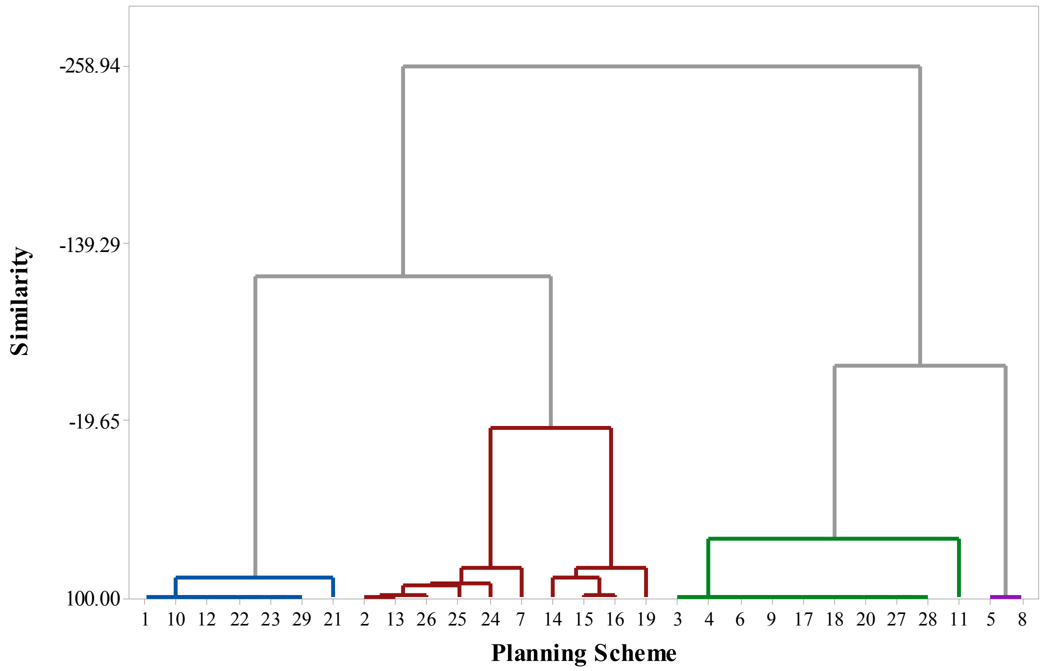


Figure 4.1 Concepts of biodiversity articulated in planning schemes and interviews

Source: Content analysis of planning schemes conducted in 2017-2018 as part of this research.



1 = Break O'Day; 2 = Brighton; 3 = Burnie; 4 = Central Coast; 5 = Central Highlands; 6 = Circular Head; 7 = Clarence; 8 = Derwent Valley; 9 = Devonport; 10 = Dorset; 11 = Flinders; 12 = George Town; 13 = Glamorgan Spring Bay; 14 = Glenorchy; 15 = Hobart; 16 = Huon Valley; 17 = Kentish; 18 = King Island; 19 = Kingborough; 20 = Latrobe; 21 = Launceston; 22 = Meander; 23 = Northern Midlands; 24 = Sorell; 25 = Southern Midlands; 26 = Tasman; 27 = Waratah-Wynyard; 28 = West Coast; 29 = West Tamar.

Figure 4.2 Dendogram of concepts of biodiversity identified in planning schemes (cluster analysis groups)

Source: Integrated statewide analysis conducted in 2018 based on content analysis of planning schemes conducted in 2017-2018.

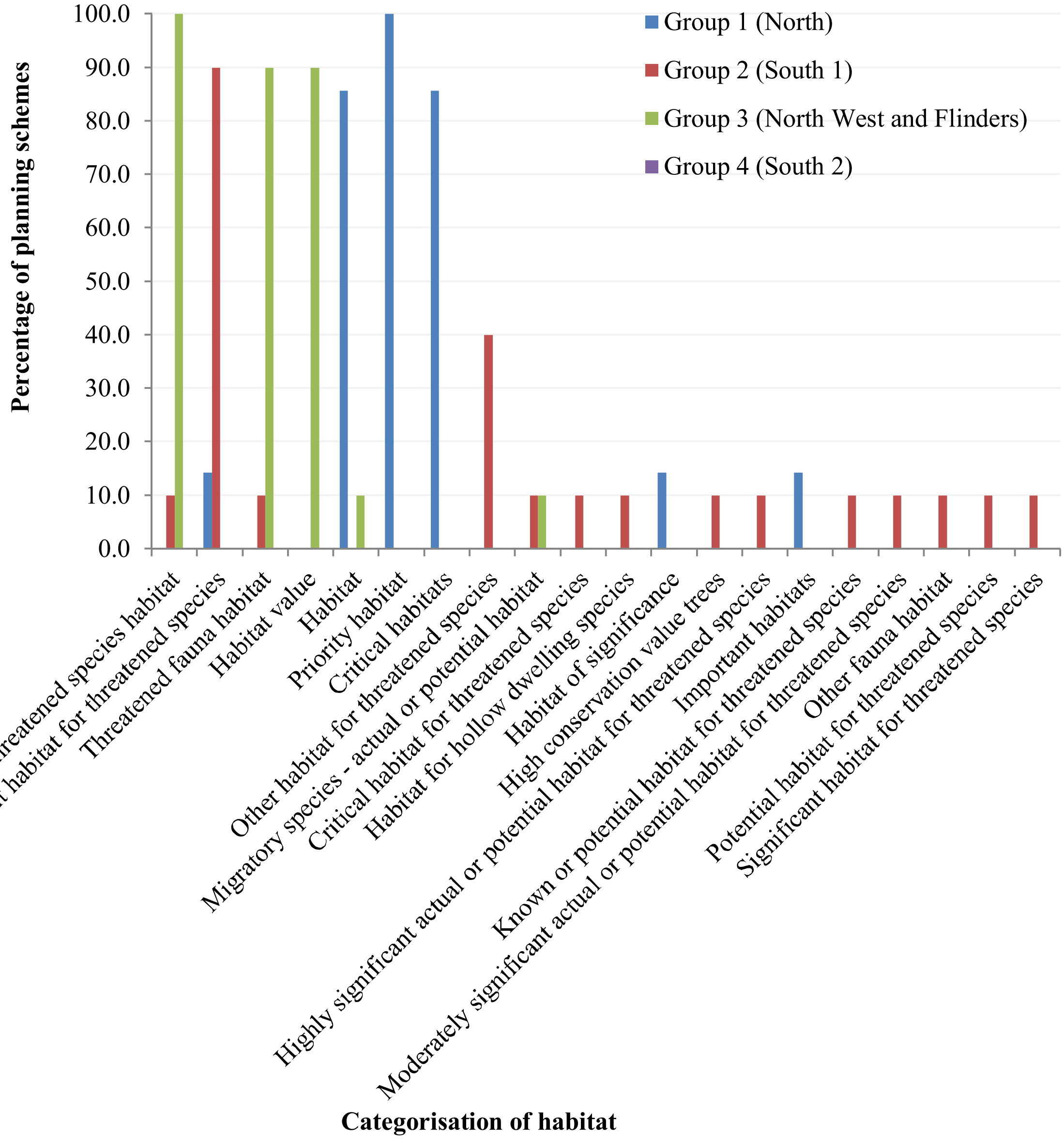


Figure 4.3 Percentage of planning schemes identifying concepts of biodiversity relating to habitat by group

Source: Integrated statewide analysis conducted in 2018 based on content analysis of planning schemes conducted in 2017-2018.

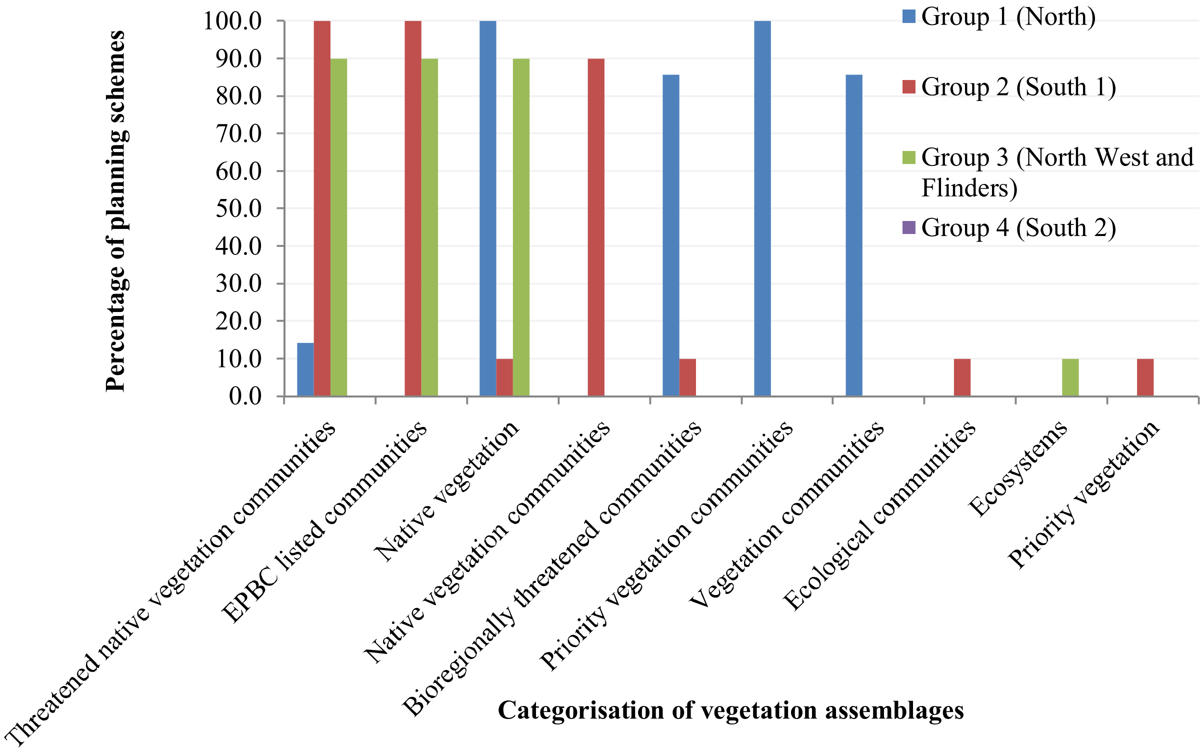


Figure 4.4 Percentage of planning schemes identifying concepts of biodiversity relating to vegetation assemblages by group

Source: Integrated statewide analysis conducted in 2018 based on content analysis of planning schemes conducted in 2017-2018.

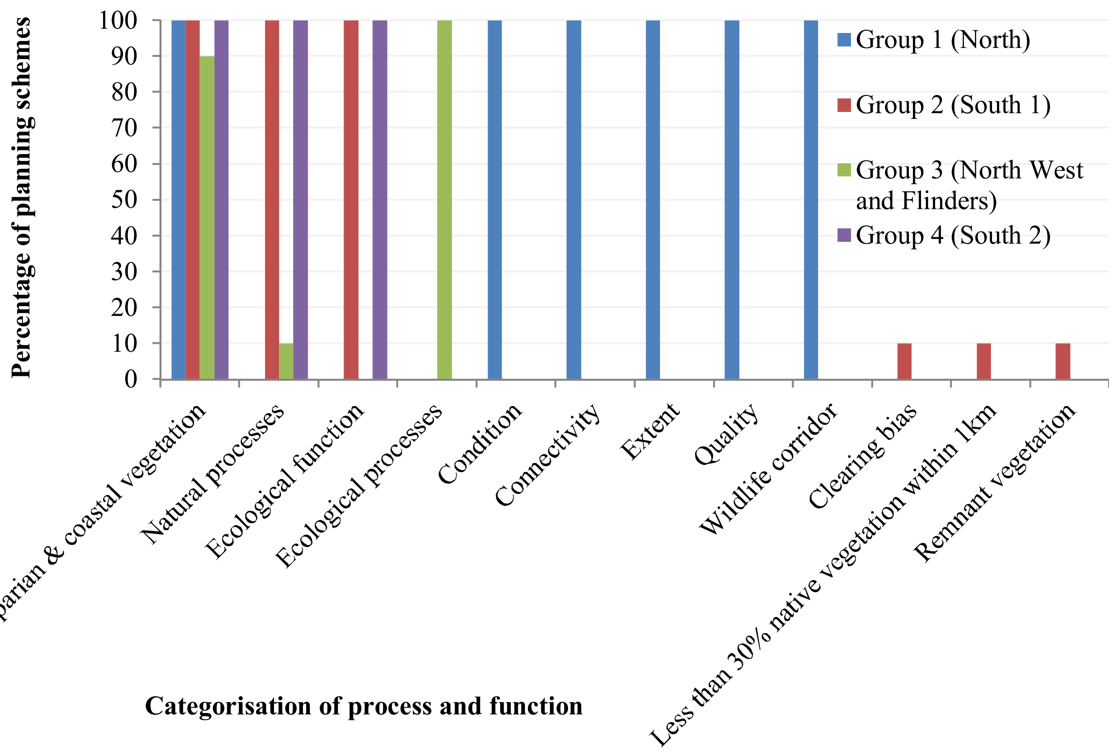


Figure 4.5 Percentage of planning schemes identifying concepts of biodiversity relating to processes and function by group

Source: Integrated statewide analysis conducted in 2018 based on content analysis of planning schemes conducted in 2017-2018.

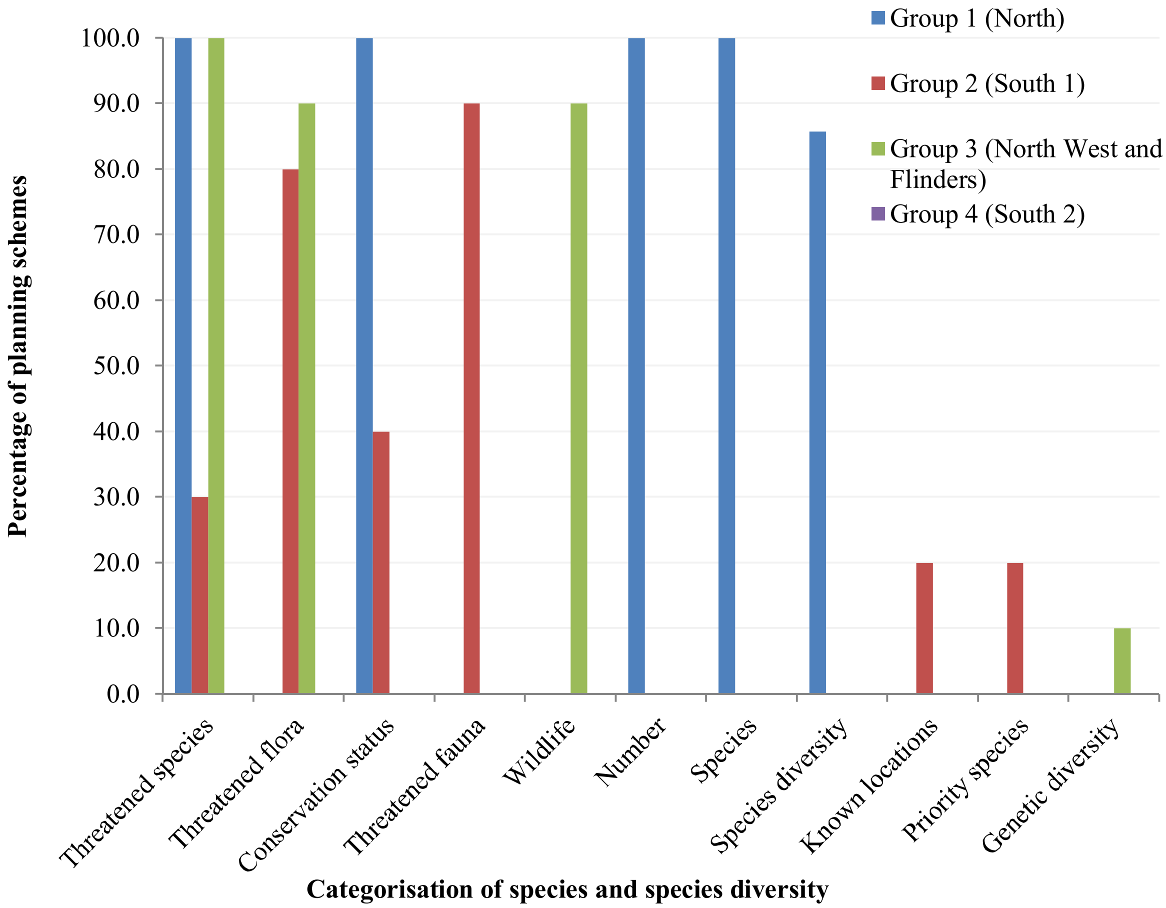


Figure 4.6 Percentage of planning schemes identifying concepts of biodiversity relating species and species diversity identified in planning schemes by group

Source: Integrated analysis of planning schemes conducted in 2017-2018.

The development of a statewide NAC and the collaboration between all LGAs to identify and apply consistent concepts of biodiversity represent a significant step towards the integration of biodiversity into land use planning in Tasmania, at least at a procedural level. Once the Local Provision Schedules (LPSs) are finalised and the schemes declared, for the first time all planning schemes will incorporate consistent provisions enabling consideration of the same concepts of biodiversity. Whether or not this consistency in provisions and concepts results in substantive outcomes for biodiversity is another question entirely, and one addressed further in chapters 5-7.

4.3 Conclusion

In this chapter I have demonstrated the significant variation in identification of concepts of biodiversity in contemporary planning schemes. The variation in how biodiversity is conceptualised reflects the lack of a consistent policy framework identifying and defining surrogates for biodiversity relevant to planning schemes. In the absence of such a consistent framework, each LGA has had the discretion to name concepts of biodiversity they deemed appropriate in their interim schemes. This chapter also established a distinction between conceptualisation of biodiversity and operationalisation, with some concepts identified but not given effect via the provisions. These findings are similar to those of Zinngrebe (2018), with the specification and operationalisation of biodiversity surrogates variable and different planning authorities using different terminology and definitions.

The variation in concepts of biodiversity and terminology, the lack of clear definitions and the difference between concepts mentioned and concepts considered are barriers to the effective integration of biodiversity in land use planning. The SPPs appear to align concepts mentioned and considered across all schemes, giving the impression that the SPPS are a step closer to substantive integration of biodiversity. However, the SPPs lack definitions and measurable indicators, creating uncertainty around interpretation and implementation.

While explicit identification and clear definitions of biodiversity concepts in planning schemes are a prerequisite for integrating biodiversity conservation, even where incorporated into the provisions, impacts on biodiversity are only able to be assessed where they are subject to the rules. This is the focus of Chapter 5, where I examine the extent of biodiversity code application and the extent of exemptions under the interim planning schemes and the SPPs.

Chapter 5 - Concepts of biodiversity in practice

In Chapter 4 I explored concepts of biodiversity that are named in planning schemes and therefore are considered as important for conservation. While naming concepts in planning schemes is a prerequisite for enabling consideration of these concepts, even where named, biodiversity can only be considered where rules apply. In the first instance, the rules within a code can only apply when the code itself applies. In essence, a planning permit may be required when undertaking development that impacts on concepts of biodiversity identified in the scheme. Under s3 of the *Land Use Planning and Approvals Act 1993* (LUPAA), development includes subdivision, buildings and works, with works including the removal, destruction or lopping of trees and the removal of vegetation (section 3.3).

If undertaking development has the potential to impact on concepts of biodiversity identified in the scheme *and* the code applies, the code may be triggered and an assessment against the relevant planning provisions is required. However, where development has the potential to impact on concepts of biodiversity identified in the scheme *but* the code does not apply, assessment is not required.

In this chapter I examine the extent of biodiversity code application and the extent of exemptions under interim planning schemes to identify where biodiversity is and is not able to be considered. I then compare this to the potential extent of application and exemptions under the Tasmanian Planning Scheme (TPS).[18]

5.1 Where we count it - extent of consideration

5.1.1 Code application under interim schemes

Analysis of code application showed a significant difference in the percentage of the planning scheme area covered by code provisions between groups ($F = 5.961_{3,28}$, $p = 0.003$), with a mean of 87.6% of planning scheme areas in North interim schemes (Group 1) subject to code provisions, 43.6% in South interim schemes with biodiversity codes (Group 2), 87% in the North West and Flinders (Group 3) and 23% in South without biodiversity-type codes (Group 4) (Table 5.1 and Figure 5.1). A post-hoc Tukey Honestly Significant Difference (HSD) test indicated the Northern interim (Group 1) and North West and Flinders (Group 3) have significantly greater percentage of their extent subject to code provisions than the Southern interim schemes (Groups 2 and 4) (Table 5.1).

This difference in extent of code application may be explained by variation in methods of, and triggers for, code application across the regions, including whether the code is applied via statutory overlays, via textual application or both (section 3.3). In striving for certainty on values that warrant conservation, scientific data at varying scales and levels of reliability has been integrated into some planning instruments in the form of statutory maps or overlays. These overlays are used to determine the spatial application of biodiversity regulations or development standards and essentially limit the

[18] This chapter draws on the results of the content analysis of planning schemes (section 2.1.3), the spatial data analysis (section 2.1.4), the semi-structured interviews (section 2.1.2) and the integrated analysis (section 2.1.5).

application of the relevant planning scheme standards for biodiversity to mapped areas. The other approach to code application is via the text in the scheme, or textual application. Where textual application of the code is relied upon, it is the ordinance in the scheme and any associated definitions that determine whether the code applies rather than a map. This approach enables a level of interpretation and discretion in determining where the code applies. Consequently, the application of a biodiversity-related code via textual application has a significant positive relationship to the percentage of each local government area (LGA) subject to code provisions, with those applying the code via text having a greater percentage of the area subject to the code (M = 100%) relative to those who do not (M = 35%) ($F = 72.14_{3,28}$, $p < 0.001$) (Table 5.1).

In the Northern interim scheme (Group 1), application was via a combination of statutory map and text, with the exception of the Launceston Interim Planning Scheme 2013, which only applied the code via a statutory map. The statutory maps in the Northern interim schemes (Group 1) represent priority habitat. Under Clause E8.2.1 (a), when a site is located within this map, the provisions under Clause E8.6.1 of the Scheme apply unless otherwise exempt. The statutory maps applied across an average of 27% of the extent of LGAs in Group 1 (Figures 5.2 and 5.3). With the exception of the Launceston Interim Planning Scheme 2013, under Clause E8.2.1 (b) of the Northern interim schemes (Group 1), code provisions also apply by textual application. Total code application by statutory map and textual application covered 93.5% of the planning scheme areas within this group and a mean of 87.6% of each LGA (Table 5.1) (Figure 5.1).

Code application in the Southern interim schemes with biodiversity-related codes (Group 2) was predominantly via statutory map (Figures 5.3 and 5.4). The only textual application in Group 2 is for riparian and coastal vegetation via the Waterway and Coastal Protection Code rather than the Biodiversity Code. While code application for riparian and coastal vegetation is generally via the statutory map, there is provision within Table E11.1 to apply the code outside the statutory map where one of the definitions of a waterway is satisfied. The mean percentage of planning scheme areas within Group 2 subject to biodiversity-related code provisions is 21% (Figure 5.1) and the mean percentage of each LGA subject to the code was 43.6% (Table 5.1).

Code application in Group 3 (the North West interim schemes and Flinders Island) is via textual application, with the exception of the Burnie Interim Planning Scheme 2013, which includes a statutory map identifying a Tree Preservation Area (Figure 5.4). The mean percentage of planning scheme areas within Group 3 subject to code provisions is 97% (Figure 5.1) and the mean percentage of each LGA subject to the code was 87% (Table 5.1).

The Southern interim schemes without a biodiversity code (Group 4) have the lowest levels of coverage of biodiversity-related code provisions (total percentage 23% and mean percentage of 23%) (Figure 5.1). The low percentage of coverage reflects the fact these schemes did not adopt a biodiversity code. Therefore, within Group 4, biodiversity-related code provisions are limited to the extent of the riparian and coastal vegetation either in the statutory map or meeting the definition of a waterway.

A Tukey HSD indicates Groups 1 and 3, or the Northern and North West interim schemes, had a significantly greater percentage of their total extent subject to biodiversity-related code provisions than interim schemes in the South (Groups and 2 and 4) (Table 5.1) (Figure 5.1). Within Group 2, code application ranged from 14% in the Huon Valley, to 93% in Kingborough (Figure 5.2). There was significant variation in code application within Group 2 depending upon population, with a positive correlation between population and the percentage of the LGA subject to the code (r = 0.681, p = 0.03). There was also a positive correlation between the percentage of each LGA in group 2 subject to the code and the percentage of native vegetation and extent of threatened native vegetation in the general residential zones (r = 0.646, p = 0.044; r = 0.713, p = 0.021 respectively). There was no relationship between the percentage of the LGA subject to the code and other characteristic attributes including growth or the extent of protected areas. These results suggest that biodiversity considerations may be more accepted within more populated areas and where areas zoned for residential development also contain native vegetation.

As code application was broad in some LGAs and encompassed a range of landscapes, including cleared land and urban areas, it was also informative to examine and compare the extent to which code provisions encompass biodiversity values. The following analysis was based on the mapped extent of native vegetation communities (Department of Primary Industries Parks Water and Environment 2013a) and threatened native vegetation communities (Department of Primary Industries Parks Water and Environment 2014) as surrogates for biodiversity within areas subject to code provisions relating to these biodiversity concepts.[19]

There was a significant difference between groups in the percentage of the mapped extent of native vegetation communities subject to code provisions within each group ($F = 4.45_{3,28}$, p = 0.012). A Tukey HSD indicates the Northern interim (Group 1) and North West and Flinders (Group 3) had a greater percentage of native vegetation subject to code provisions relative to the Southern interim schemes (Groups 2 and 4) (Table 5.1). Therefore the extent of native vegetation subject to code application in the North and North West was more extensive than the South.

[19] TASVEG v 3.0 is a Tasmania-wide vegetation map comprising 156 mapping units captured at a nominal scale of 1:25,000 and produced by the Tasmanian Vegetation Monitoring and Mapping Program (TVMMP) (Department of Primary Industries Parks Water and Environment 2013b). TNVC 2014 is a statewide map of the indicative extent of the 39 communities listed under Schedule 3A of the NCA and also produced by the TVMMP. TNVC 2014 is derived from TASVEG 3.0 for all but four of the 39 communities (Department of Primary Industries Parks Water and Environment 2015a).

The mapped extent of native vegetation communities derived from TASVEG 3.0 is used as a surrogate for biodiversity for the purposes of spatial analysis as there is the potential for any patch of native vegetation to constitute one of the concepts identified in the planning scheme. The extent of threatened native vegetation communities derived from TNVC 2014 are used as surrogates for the purposes of analysis as they represent the most common concept of biodiversity interim planning schemes aim to protect. These datasets are also recognized as appropriate for analysis at the statewide or regional scale (Department of Primary Industries Parks Water and Environment 2013b, 2015a). Notwithstanding, the limitations of these datasets need to be acknowledged, with the results being indicative only (sections 5.2, 5.3 and 6.1).

The mapped extent of threatened native vegetation communities subject to code provisions differed between groups ($F = 4.89_{3,28}$, $p = 0.008$). However in this instance, the percentage of threatened native vegetation communities subject to code provisions was similar for those groups with biodiversity-type codes (Groups 1-3) and only differed for those Southern schemes without biodiversity codes (Group 4) (Table 5.1). These results indicate that interim schemes in Group 2 are disproportionately concerned with threatened native vegetation communities rather than native vegetation communities more broadly (Table 5.1) (Figures 5.5 and 5.6).

There was also a significant difference between groups in relation to the percentage of native vegetation and the percentage of threatened native vegetation within the urban-type zones[20] that was subject to biodiversity-related code provisions ($F = 21.20_{3,28}$, $p < 0.001$; $F = 40.99$, $p < 0.001$ respectively) (Table 5.1). The Northern interim schemes (Group 1) had the greatest percentage of native vegetation and threatened native vegetation within urban-type zones subject to code provisions ($M = 83.4\%$ and 94.72% respectively). The Southern interim schemes with biodiversity codes (Group 2) had the highest percentage of mapped native vegetation within urban-type zones subject to code provisions (93.15%) (Table 5.1). There was also a significant difference between groups in the extent and percentage of native vegetation in the General Residential subject to code provisions ($F = 5.88_{3,28}$, $p = 0.004$; $F = 17.87_{3,28}$, $p < 0.001$), the percentage and extent of native vegetation in the Low Density Residential zone subject to code provisions ($F = 14.08_{3,28}$, $p < 0.001$; $F = 3.18_{3,28}$, $p = 0.041$), and the percentage of threatened native vegetation subject to code provisions in the Low Density Residential zone ($F = 8.84_{3,28}$, $p < 0.001$) and the Rural Living zones ($F = 4.68_{3,28}$, $p = 0.010$) (Table 5.1).

5.1.2 Code application under the Tasmanian Planning Scheme

Under the TPS, the priority vegetation areas within the mandatory Natural Assets Code (NAC) are applied via a statutory map or overlay (Tasmanian Government 2018). Therefore, the concepts of biodiversity defined under the code can only be considered where these values are located within the statutory map. Consistent with the definition of priority vegetation, the priority vegetation area overlay is intended to represent native vegetation that: forms an integral part of a threatened native vegetation community as prescribed under Schedule 3A of the *Nature Conservation Act 2002* (NCA); is a threatened flora species; forms a significant habitat for a threatened fauna species; or, has been identified as native vegetation of local importance (Tasmanian Planning Commission 2017a). Therefore the overlay is intended to be a spatial representation for the biodiversity surrogates identified in the scheme.

While the NAC forms part of the State Planning Provisions (SPPs), the overlay triggering the NAC forms part of the Local Provisions Schedule (LPSs) (section 34.2). As the overlay forms part of the LPSs, the statutory maps are prepared by each planning authority rather than the State.

[20] Urban-type zones for the purposes of this analysis include the following: General Residential; Low Density Residential; Inner Residential; Utilities; Particular Purpose - urban growth; Commercial; Light Industrial; Local Business; General Industrial; General Business; Village; Central Business; Major Tourism; Urban Mixed Use; Particular Purpose – all other.

Notwithstanding, the preparation of the overlay must comply with s8A Guidelines No. 1 (Tasmanian Planning Commission 2017a). These consistent zone and code application guidelines specify the statewide datasets that may be used as the basis for the overlay (NAC 7 – NAC 10). However fit-for-purpose statewide datasets are only available for some surrogates (native vegetation communities and threatened native vegetation communities) and are not available for others (significant habitat for threatened fauna or native vegetation of local importance). Furthermore, no definition of significant habitat or native vegetation of local importance is provided in the guidelines (section 4.2).

Under guideline NAC 11, planning authorities have the option to utilise their own mapping to address anomalies or provide more accurate data (NAC 11). Given the inadequacies of statewide datasets and mapping, and the absence of clear definitions for some biodiversity surrogates, all planning authorities have derived their priority vegetation area overlays from the Regional Ecosystem Model (REM) developed by Natural Resource Planning (NRP) (Knight & Cullen 2012) (section 4.2).[21]

> The REM is a comprehensive spatial system for storing data on the biodiversity of an area, for examining the relationships between them, and assigning Level of Concern classes to assist prioritising their management. The REM provides a structured classification of biodiversity based around its vegetation and priority species (Biological Significance) and the characteristics of the landscape that determine its ability to sustain the elements of biodiversity it contains (Landscape Ecological Function) (Knight & Cullen 2012:11).

The mean percentage of each LGA covered by the priority vegetation mapping applied in accordance with the code application guidelines under the SPPs[22] is lower for 76% (n = 22) of LGAs relative to the percentage subject to a biodiversity-related code under the interim schemes (Figure 5.7 and 5.8). The largest decrease in percentage was in Group 3 (-67%), followed by Group 1 (-49 %) (Figure 5.9). This difference in coverage of priority vegetation mapping and code application under interim schemes is partially a reflection of the fact that the priority vegetation map only applies where the data indicates priority vegetation is present and the code application guidelines are satisfied (section 5.2.4). Whereas the interim schemes in the North and North West apply by textual application across most of their extent.

[21] The REM model integrates spatial data on the distribution of the major components of biodiversity and models key biodiversity attributes, utilising an extensive range of datasets from a range of sources and preferencing field verified data where available Knight (2016).

[22] The code application guidelines further limit the application of the priority vegetation mapping to specified zones (NAC 13) and specified circumstances in specified zones (NAC 14) (Tasmanian Planning Commission 2017a) (section 5.2). The analysis presented here applies these guidelines to the priority vegetation mapping undertaken by NRP for Tasmanian councils, as, in the absence of this mapping being finalised by each planning authority, this represents the best approximation of the potential extent of priority vegetation area overlays under the Tasmanian Planning Scheme.

Table 5.1 The extent and percentage of code application (total, native vegetation and threatened native vegetation) within and across zones relative to groups (bold indicates highest value for the variable)

Variables with significant relationship to groups	Group 1 (North)	Group 2 (South 1)	Group 3 (North West & Flinders)	Group 4 (South 2)	F	P-value
Number of urban type zones where code applies	**8a**	7.4a	2.6b	5ab	$12.72_{3,28}$	<0.001
Percentage total area subject to code provisions	**87.6a**	43.6b	**87a**	23ab	$5.961_{3,28}$	0.003
Percentage of native vegetation subject to code provisions	**89.2a**	58.3ab	**89.65a**	14.95b	$4.45_{3,28}$	0.012
Percentage of threatened native vegetation subject to code provisions	**98.19a**	83.46a	87.12a	25.4b	$4.89_{3,28}$	0.008
Extent native vegetation within General Residential zone subject to code provisions	**50.9a**	6.07b	0.135b	2.55ab	$5.88_{3,28}$	0.004
Percentage native vegetation within General Residential zone subject to code provisions	**87.2a**	23.68b	0.905b	6.71b	$17.87_{3,28}$	<0.001
Percentage threatened native vegetation within General Residential zone subject to code provisions	**92.74a**	32.3b	0c	7.4bc	$18.72_{3,28}$	<0.001
Percentage native vegetation within Low Density Residential zone subject to code provisions	**87.0a**	42.6b	0c	10.13bc	$14.08_{3,28}$	<0.001
Percentage threatened native vegetation within Low Density Residential zone subject to code provisions	**85.2a**	59.7a	0b	26.09ab	$8.84_{3,28}$	<0.001
Extent native vegetation within Low Density Residential zone subject to code provisions	**181.4a**	46.2ab	0b	19.2ab	$3.18_{3,28}$	0.041
Extent native vegetation within urban type zone subject to code provisions	**683a**	273.6ab	0.651b	145.4ab	$4.47_{3,28}$	0.012
Percentage native vegetation within urban type zone subject to code provisions	**83.4a**	52.22b	0.713c	17.85bc	$21.20_{3,28}$	<0.001
Extent threatened native vegetation within urban type zones subject to code provisions	44.90ab	**90.2a**	0.0378b	31.1ab	$5.25_{3,28}$	0.006
Percentage threatened native vegetation within urban type zone subject to code provisions	**94.72a**	76.6a	0.144b	28.77b	$40.99_{3,28}$	<0.001
Percentage native vegetation within Rural Living zone subject to code provisions	88.4a	55.1ab	**90a**	7.665b	$4.68_{3,28}$	0.010

Source: Integrated statewide analysis conducted in 2018 based on content analysis of planning schemes conducted in 2017-2018 and spatial data analysis conducted in 2017-2018, both as part of this research.

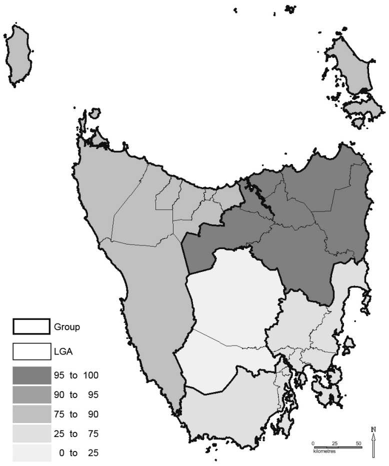


Figure 5.1 Percentage of total extent subject to biodiversity-related code provisions by group

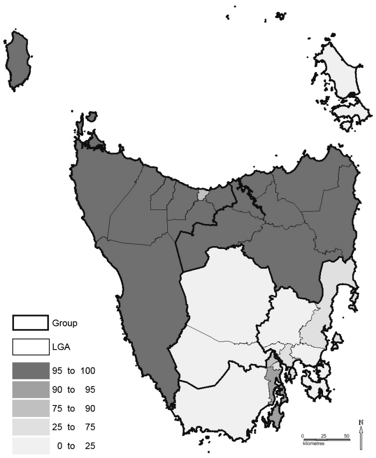


Figure 5.4 Percentage of total extent subject to statutory map provisions by LGA

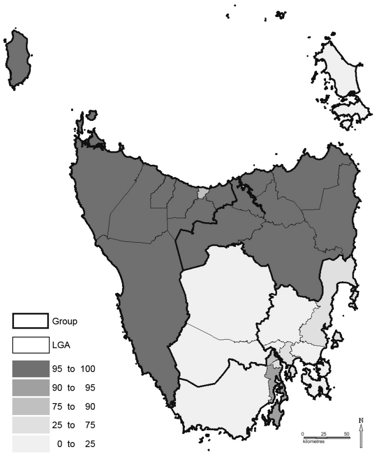


Figure 5.2 Percentage of total extent subject to biodiversity-related code provisions by LGA

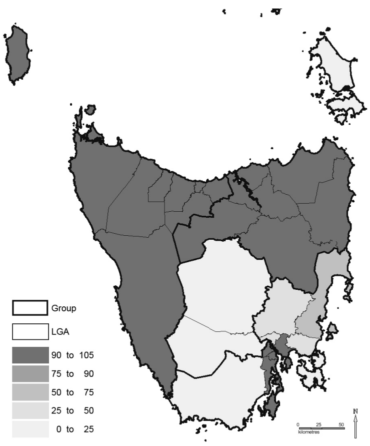


Figure 5.5 Percentage of native vegetation communities subject to biodiversity-related code provisions by LGA

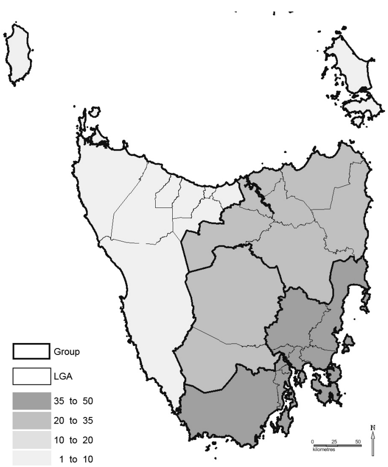


Figure 5.3 Percentage of total extent subject to statutory map provisions by group

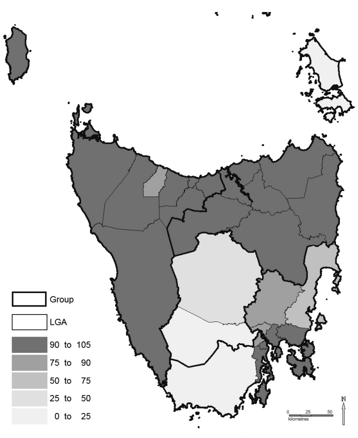


Figure 5.6 Percentage of threatened native vegetation communities subject to biodiversity-related code provisions by LGA

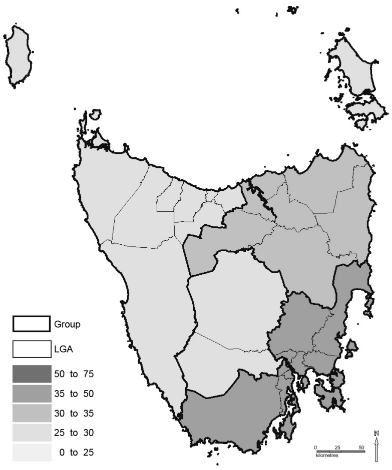


Figure 5.7 Percentage of total extent within potential priority vegetation area by group

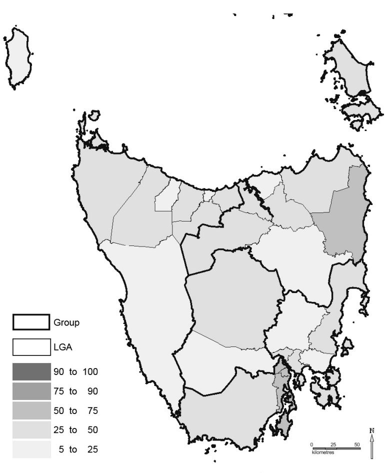


Figure 5.8 Percentage of total extent within potential priority vegetation area by LGA

Sources for Figures 5.1 – 5.8: Spatial data analysis conducted in 2017-2018 as part of this research. Data derived from: Department of Primary Industries Parks Water and Environment (2013a); Department of Primary Industries Parks Water and Environment (2014); Knight (2018); The LIST (2015a); The LIST (2015b).

5.2 Where we don't count it – extent of exclusions and exemptions

Of equal importance to examining where the code applies, is examining where it does *not*, as this signifies biodiversity beyond consideration and also potentially biodiversity at risk. The basis for the exclusion of biodiversity from code application include: (i) code exemptions for specified activities; (ii) reliance on statutory maps, which exclude areas based on the data; and, (iii) zone exemptions from code application, which preclude the code from applying in specified zones irrespective of the presence of values, or limit the code application to specific types of development within that zone.

One of the major criticisms of current biodiversity conservation and environmental planning regulations are the exemptions, particularly for clearing associated with urban and peri-urban development (Environment Defenders Office (Qld) 2010b; Environment Defenders Office (Vic) 2012; Farrier, Kelly & Langdon 2007; Field, Burns & Dale 2012). Exemptions for peri-urban and urban development are a critical consideration in evaluating the extent to which legislation and environmental planning instruments provide for biodiversity conservation, particularly given the importance of urban remnants and the rural-urban interface for biodiversity conservation (section 1.1) (Bekessay et al. 2012; Buxton et al. 2006; Fallding 2004; Farrier, Kelly & Langdon 2007; Field, Burns & Dale 2012; Ives et al. 2010; Southern Tasmanian Councils Authority 2013; State of the Environment Committee 2011; Webb 2009). Less obvious are the implications of exemptions for rural developments. In this section I illustrate the extent of urban and rural exemptions for impacts on biodiversity under the interim schemes and the TPS, with detailed consideration of the exemptions within urban contexts.

5.2.1 Code exemptions, which exempt specific types of development from the code

Code exemptions identify use or development which is exempt from the requirements of the code. There is a significant difference in the number of exemptions between groups ($F = 284.22_{3/28}$, $p < 0.001$), ranging from Group 1 with a mean of 1 exemption, to Group 2 with a mean of 19 exemptions. These exemptions are generally intended to: exempt activities which are subject to other regulations, such as the *Forest Practices Act 1985*; exempt maintenance activities for statutory authorities such as water and sewer entities, electricity road authorities or other government agency; or, exempt works necessary for safety purposes, including bushfire hazard management. Under the State Planning Provisions (SPPs) of the TPS, the exemptions are generally consistent with those in Group 2 (Southern interim schemes with biodiversity-related codes). As the exemptions apply on a case-by-case basis it is not possible to quantify the implications of such broad exemptions.

A range of views were expressed by interviewees in relation to exemptions, with those with planning expertise ($n = 4$, 12%) expressing views in support of exemptions, advocating their importance in making practical land use planning decisions.

> From a practical respect [exemptions are] necessary. You could argue all day whether there are enough or too many, but you do need to have them because every time someone takes a branch off a tree we don’t want any implications, and we certainly don’t want to deal with a neighbour who is whinging about them cutting a branch of their tree (Strategic Planner 1 2015).

> It [the planning scheme] basically said you can't do anything to any native vegetation without a permit. That can't conceivably survive in a modern planning system (Manager Planning 5 2015).

In contrast, 21% ($n = 7$) interviewees expressed concerns about the loopholes created by exemptions, clarifying this was the reason the Northern interim schemes had so few.

> We couldn't settle on exemptions that didn't have thumping great loopholes in it that would be abused. Because we all had experience of that with our old schemes… Exemptions are dangerous. Particularly judgement based exemptions (Manager Planning 2 2015).

> Otherwise you just get this constant incremental clearing and people just go 'oh no don't worry it's exempt' (Ecological Consultant 4 2015).

5.2.2 Limitations of statutory maps

Application of the code via a statutory map has a negative relationship to the extent of code application, with coverage of the code significantly less where a statutory map is relied up than when via textual application (section 4.2.1). If the statutory map encompassed the appropriate suite of values which collectively constitute biodiversity and was a true reflection of these values, reliance on a statutory map would provide the longed for certainty about when the rules applied. However the map is not the reality.

The statutory overlay approach relies on maps, using both field-verified and desk-top data at varying scales and levels of reliability, to determine the spatial application of biodiversity regulations or development standards. This approach therefore limits the application of the relevant planning scheme standards for biodiversity to where the map indicates the vegetation or value is present. While such an approach creates legal certainty for the landowner or developer, it also has the potential to result in perverse outcomes for biodiversity where ‘you might be keeping out of the overlay and be impacting on the most significant value on the property’ (Ecological Consultant 2 2015).

A number of interviewees (n = 4), all of whom were statutory planners, expressed the view that the certainty created by a statutory mapped based approach was important.

> We strongly advocate the map. It’s really difficult for us to introduce the uncertainty of not having that map because everything has to be basically a merits based assessment from first principles when somebody comes in (Strategic Planner 1 2015).
>
> They have to be mapped… It has to be upfront (Manager Planning 4 2015)
>
> I think it's essential you have a map personally because that’s the way our system works (Manager Planning 5 2015).
>
> I think that's challenge … you've still got to put the lines on the map (Statutory Planner 3 2015).

One interviewee acknowledged the benefits of a map-based approach but only where the data was fit-for-purpose.

> Obviously it makes it easier for a developer. If you’ve got a line on a map and you try and keep your footprint on one side of that line, so you are avoiding, if you’re using something like biodiversity protection overlay which you know is going to trigger the biodiversity code, the effectiveness of that in reality is dependent on how good those maps are and how accurate those lines are (Ecological Consultant 2 2015).

In contrast, interviewees across a range of roles, with direct and indirect roles in statutory planning, within and external to Government, at the local and State scales, were of the view that statutory maps are problematic (n = 10).

> I would prefer there was always that site-based assessment option for areas that were outside mapped areas where Council had some basis for considering there were biodiversity values which warranted that further information. And then potentially that it would be treated as if it were in a mapped area on that basis… providing they can demonstrate there's a reason for that and they're not just asking everybody to do a full assessment of every site. (NGO Expert 1 2015).
>
> The thing with all these maps is, particularly, I noticed with the biodiversity protection overlay, it is often following TASVEG mapping. TASVEG is at a landscape scale and when you get to the property it can be completely wrong (Ecological Consultant 2 2015).
>
> An overlay by definition would be a line on a map and it's meaningless for many species (NGO Expert 3 2015).
>
> I think it should be site-by-site. I think absolutely. I feel very strongly that it shouldn't be a map because our data is not good enough to rely on a map (NRM 2 2015).

Statutory maps have been utilised in a number of Australian States, with concerns expressed about the limitations of this approach (Environment Defenders Office (Vic) 2013; Field, Burns & Dale 2012; Port Phillip and Westernport Catchment Management Authority 2008). In Queensland, the scale and accuracy of the mapping means that it has limited ability to identify and protect small patches of remnant vegetation at the local scale, making this approach inappropriate in urban areas (Field, Burns & Dale 2012). There are also significant concerns about the shift towards a map-based approach in Victoria, with only a minority of applications requiring on-ground ecological assessments under the recent amendments (Environment Defenders Office (Vic) 2013). A number of Victorian local councils also incorporate maps or overlays into their planning schemes as one tool for protecting biodiversity (Port Phillip and Westernport Catchment Management Authority 2008). However, according to the analysis undertaken by the Port Phillip and Westernport Catchment Management Authority (2008:18), the overlays in the respective planning schemes across the case study area 'bear very little relationship to the known and mapped information on the extent of native vegetation'.

Despite the well-documented failings of an overlay or statutory map based approach, under the SPPs all biodiversity provisions will be applied via a statutory map. Under the code application guidelines, these maps are to be based on TASVEG v3.0 (Department of Primary Industries Parks Water and Environment 2013a), Threatened Native Vegetation Communities (TNVC) 2014 (Department of Primary Industries Parks Water and Environment 2014)and the Department of Primary Industries, Parks, Water and Environments (DPIPWE) Natural Values Atlas for threatened flora and fauna species (Tasmanian Planning Commission 2017a, 2017b). TASVEG 3.0 is suited for a range of uses, including providing a statewide and regional overview, for reporting purposes and for determining the probable location of vegetation communities (Department of Primary Industries Parks Water and Environment 2013b). The TNVC 2014 is an important dataset showing the indicative extent of threatened native vegetation communities across Tasmania (Department of Primary Industries Parks

Water and Environment 2015a). To this extent it is a useful dataset for signifying the potential extent and location of threatened communities in different planning jurisdictions and different zones. However the limitations of TASVEG 3.0 and the TNVC 2014 are widely acknowledged, including a lack of equivalence between mapping communities, the spatial scale of the data and lack of currency of TASVEG mapping in some areas (Department of Primary Industries Parks Water and Environment 2013a). Consequently, these datasets should not be used in isolation for the on-ground identification of vegetation communities and confirmation of the presence or otherwise of a particular native vegetation community, including listed threatened communities, requires appropriate field validation by a qualified vegetation expert (Department of Primary Industries Parks Water and Environment 2013a). TASVEG 3.0 and the TNVC 2014 provide an indication of the estimated extent of threatened communities across Tasmania and where they might be located. However they are not fit-for-purpose at the scale of an individual development and it should not be relied upon to indicate the presence or absence of a vegetation community in the absence of field verification by a suitably qualified person.

The reliability of the available data for threatened species and threatened species habitat is also problematic, with threatened species data more indicative of survey effort than presence, and threatened fauna data based on species modelling and habitat modelling, the reliability of which varies from species to species (Department of Primary Industries Parks Water and Environment 2012). While there may be a reasonable understanding of where and what is important habitat for some species, knowledge of where this habitat is for other species is limited, particularly for landscape-scale species, which occur across a diverse range of habitats, making it difficult to determine which areas are important. For example, the potential range of the Tasmanian devil is the whole of mainland Tasmania, Robbins Island and Maria Island and potential habitat for the Tasmanian devil is all terrestrial native habitats, forestry plantations and pasture (Forest Practices Authority & Threatened Species Section DPIPWE 2012). When modelled this habitat encompasses much of the state.

The limitations of desk-top data as the basis for statutory maps, particularly TASVEG and TNVC mapping, was also reflected in the interview data, with local government planners, local government natural resource management (NRM) officers, consultant planners, ecological consultants and state biodiversity experts all highlighting inaccuracies in vegetation mapping as an issue. As one interviewee succinctly states: ‘the map is just inaccurate or it’s partly inaccurate’ (State Expert 1 2015) (section 6.1.1).

Despite this, all Southern interim schemes (Group 2) currently have statutory biodiversity overlays which are predominantly reliant on TASVEG 3.0 and TNVC 2014 mapping to identify the location of threatened communities. The application of the biodiversity code via statutory map has a significant negative relationship to the percentage of each LGA subject to biodiversity-related code provisions ($F = 6.57_{3/28}$, $p = 0.002$), with those only applying the code via statutory map having a greater percentage of native vegetation excluded from the code ($M = 41.7\%$ in Group 2 and $M = 85\%$ in Group 4). Over

4 million hectares (81%) of mapped native vegetation and 154, 809 hectares (52%) of mapped threatened native vegetation communities are currently excluded from statutory maps across all LGAs (Table 5.2).

Given the limitations with the base data, in addition to having a statutory overlay, 86% (n = 6) of schemes in Group 1 also apply the code via textual application as a safety net.

> Ideally it would be great if we had millions and millions of dollars to ground truth vegetation communities and know what we had on the ground, that's the ideal world. And then we could put far more certain provisions in a scheme working around that, having it properly mapped. Well they spent $2 million dollars to update TASVEG 2 to TASVEG 3 and it took a year and a half I think, very little change, and out of all of that we have 60% accuracy. We can't afford, we just accept that while that would be the ideal amongst ten other things that we also need mapped....it's not going to happen. So we're dealing with 60% accuracy, we're not going to have the resources to get the ground truthing we want. The safety net is necessary for biodiversity protection if we're not going to hit those danger thresholds in reality (Manager Planning 2 2015).

When this safety net was applied, the percentage of mapped native vegetation communities subject to code provisions in Group 1 increased from a mean of 40% (491, 525 hectares) to 89% (1, 048, 820 hectares). When textual application of the code was combined with statutory maps, the extent of mapped native vegetation communities and threatened native vegetation communities excluded from code application across the State decreases from 4 million hectares (81%) to 1, 649, 014 hectares (33%), and 154, 809 hectares (48%) to 95, 174 hectares (29%) (Table 5.2). These results demonstrate the limited application of statutory maps and the importance of the safety net under interim schemes.

A similar safety net has been provided in the SPPs for waterways, coastal erosion, coastal inundation and riverine flooding, which all enable the code to be applied by either a statutory map or textual application. Limiting code application to reference to a statutory map appears to be confined to bushfire and biodiversity. Limiting consideration to a statutory map was also inconsistent with other regulations, including the *Forest Practices Regulations* and Level 2 activities, which are triggered by reality not a map.

5.2.3 Zone exclusions from code application

Zone exemptions from code application preclude the code from applying in specified zones or limit the code application to specific types of development within that zone, irrespective of the presence of values. These exemptions range from total exclusion from consideration because the code does not apply to the zone or partial exclusion where it only applies in certain circumstances, such as for subdivision.

Zone exclusions under the interim schemes

Analysis of the percentage of mapped threatened native vegetation communities in each of the urban-type zones exempt or partially exempt from consideration under interim schemes shows that over 39% (266 hectares) of mapped threatened native vegetation communities within the General Residential, Inner Residential, Village, Local Business, Light Industrial and General Industrial zones are exempt or partially exempt from consideration under interim schemes (Figure 5.9) (Table 5.2). Analysis of mapped native vegetation communities indicates 63% of the mapped extent was exempt or partially exempt from consideration within the urban-type under interim schemes, totalling approximately 4, 230 hectares.

There was significant variation in the extent of native vegetation exempt within urban-type zones by group ($F = 10.8_{3/28}$, $p = 0.027$). Group 1 had the highest mean area exempt (502 hectares), with 71% ($n = 5$) interim schemes including exemptions for urban-type zones. While 90% ($n = 9$) of LGAs in Group 3 included exemptions for urban-type zones, the mean extent of exemptions was only 63.1 hectares. Only one interim scheme in Group 3 included exemptions within urban-type zones, totalling 8.72 hectares. The lack of exemptions in Group 4 reflects the absence of a biodiversity-related code rather than the extent of exemptions, resulting in all native vegetation within this group excluded, except where it is within the specified buffer distances from the coast or watercourses (922 093 hectares).

Zone exclusions under the State Planning Provisions

Under the SPPs, the proposed exemptions to urban and peri-urban type zones will be mandated across all planning schemes, with the priority vegetation area overlay limited to 'non-urban' type zones (Tasmanian Planning Commission 2017b). Urban-type zones are therefore excluded from the overlay.[23] The Agriculture Zone is also excluded from containing a priority vegetation area (Tasmanian Government 2018; Tasmanian Planning Commission 2017a). The purpose of these exclusions is to avoid undermining the zone purpose, in acknowledgement that these zones 'are a limited and valuable resource that should be protected for their main purpose' (Tasmanian Planning Commission 2017b:3). Consequently, the SPPs preference development over biodiversity within these zones.

The Agriculture Zone exclusions have the potential to be extensive, with approximately 37% of the mapped extent of threatened native vegetation communities across the State within the area identified

[23] The s8A guidelines specify the following zones as 'urban-type' zones for the purposes of the SPPs: Inner Residential; Village; Urban Mixed Use; Local Business; General Business; Central Business; Commercial; Light Industrial; General Industrial; Port and Marine; General Residential or Low Density Residential Zones, unless subdivision (Tasmanian Government 2018; Tasmanian Planning Commission 2017a, 2017b).

as unconstrained agriculture and appropriate for inclusion in the Agriculture Zone[24] (Table 5.2). While much of the land use change in rural areas is controlled under other regulations (section 3.1), development ancillary to the agricultural use, including farm buildings, residential uses and tourism ventures, are regulated by planning schemes. Identification, assessment and consideration of the potential impacts of these developments on biodiversity will be precluded under the SPPs. As illustrated by the Cambria proposal currently under assessment by the Tasmanian Planning Commission (Welch 2018), the scale of these developments have the potential to be considerable. As the purpose of the Agriculture Zone is to protect agricultural land for agricultural uses, ancillary development within this zone will be pushed into those parts of a site not utilised for agriculture, namely the areas containing native vegetation. These zone exclusions are alarming and inconsistent with clearing controls for agriculture.[25]

While the urban-type zone exclusions are smaller in extent than the Agriculture Zone exemptions (Table 5.2), they are of equal if not greater concern, as, in the absence of consideration in the development approval process, the likelihood of all of these values being lost to development over time is high. Assuming the interim scheme zoning largely translates to the TPS[26], the extent of mapped threatened native vegetation which could be cleared in conjunction with a planning permit without any assessment of the impact on biodiversity increases from around 266 hectares to approximately 650 hectares and the extent of mapped native vegetation communities increases from 4, 230 hectares to 6, 682 hectares (Table 5.2). Analysis of priority vegetation mapping derived from the REM and consistent with code mapping guidelines[27] show 6,756 hectares identified as priority vegetation will be exempt from consideration within the urban-type zones, increasing the extent of exclusions from 3, 603 hectares under interim schemes (Table 5.2).

[24] The s8A guidelines specify that the spatial application of the Agriculture Zone should be based on the land identified in the 'Land Potentially Suitable for Agriculture Zone' layer published on the LIST, taking into consideration a range of factors (Tasmanian Planning Commission 2017a). The analysis undertaken here relies upon land identified as unconstrained within this dataset, as this represents a conservative estimate of what the s8A guidelines expect.

[25] Clearance for agriculture is regulated under the Forest Practices System and permits are required for any clearance and conversion of vulnerable land, including threatened native vegetation or threatened species habitat (*Forest Practices Regulations* 2007).

[26] This assumption is reasonable as the development of the LPSs requires translation of zones unless such a translation is inconsistent with the zone application guidelines.

[27] The s8A guidelines further limit the application of the priority vegetation mapping to specified zones (NAC 13) and specified circumstances in specified zones (NAC 14) (Tasmanian Planning Commission 2017a) (section 5.2). The analysis presented here applies these guidelines to the priority vegetation mapping undertaken by NRP for Tasmanian councils, as, in the absence of this mapping being finalised by each planning authority, this represents the best approximation of the potential extent of priority vegetation area overlays under the Tasmanian Planning Scheme.

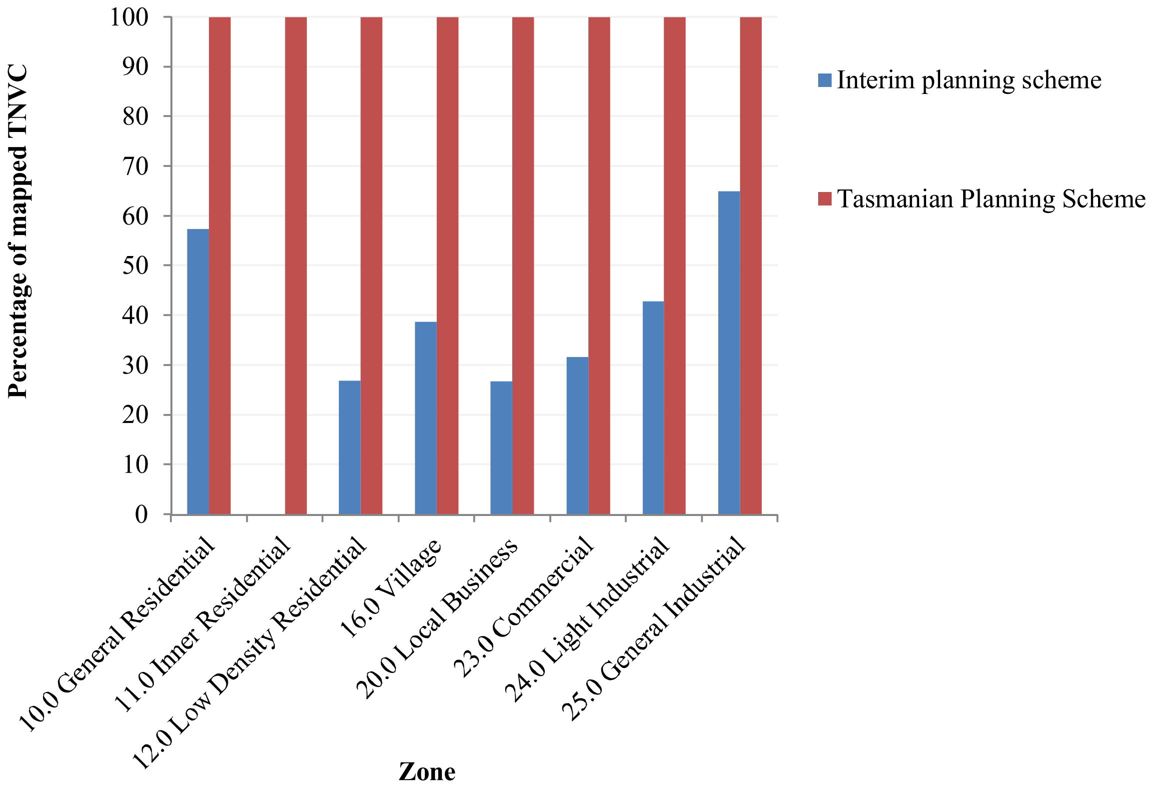


Figure 5.9 Total percentage of mapped threatened native vegetation communities (TNVC) exempt or partially exempt from biodiversity-related code provisions under interim planning schemes relative to equivalent zone under the Tasmanian Planning Scheme

Source: Spatial data analysis conducted in 2017-2018 as part of this research. Data derived from: (Tasmanian Government 2018; Tasmanian Planning Commission 2017a; The LIST 2015a, 2015b).

Table 5.2 Extent (hectares) and percentage of biodiversity excluded from consideration under interim schemes and the SPPs

Biodiversity surrogate	Statutory map exclusions				Urban-type zone exclusions				Agricultural zone exclusions				Total code exclusions			
	Interim		SPP		Interim		SPP		Interim		SPP		Interim		SPP	
	Ha	% statewide total	Ha	% state wide extent	Ha	% urban-type zones total	Ha	% urban-type zone extent	Ha	% state wide total	Ha	% state wide extent	Ha	% state wide extent	Ha	% statewide extent
TNVC	154, 809	52	119,657	37	266	39	650	100	n/a	n/a	119, 007	37	95, 174	29	119,657	37
Native vegetation	4, 004, 669	81	2, 398, 685	48.1	4, 230	63	6, 682	100	n/a	n/a	825, 362	16.5	1, 649, 014	33	2, 398, 685	48.1
Priority vegetation	2, 074, 787	75	796,402	29	3, 603	23	6,756	100	n/a	n/a	789 646	28	755,373	27	796,402	29

Source: Spatial data analysis conducted in 2017-2018 as part of this research. Data derived from: Department of Primary Industries Parks Water and Environment (2013a); Department of Primary Industries Parks Water and Environment (2014); Knight (2018); The LIST (2015a); The LIST (2015b).

Does urban biodiversity matter?

It was evident from the semi-structured interviews that consideration and protection of biodiversity in urban contexts was contested. There were some interviewees (*n* = 7, 21%) who identified the importance of biodiversity on the urban fringe and expressed concerns about the implications of urban development on these values. These responses, from interviewees across all areas of expertise, support the view that impacts on biodiversity should be considered irrespective of the underlying zone.

> We still have abundant wildlife on the urban fringe and, therefore, urban development, peri-urban development and urban sprawl is going to fragment and reduce the distribution of those species and increase the threats to those species. So urban sprawl is going to be an ongoing challenge, particularly at the local government level where Tasmania's population is seen to increase, it's increasing at the moment … So population pressure and need for resources is going to threaten all of our species, not just threatened species (NGO Expert 2 2015).

> Biodiversity values are valuable wherever they pop up and it's the smaller scale fragmentation within urban zones that can have the greatest damage… Ideally I don't think that there should be zones that are exempt. I think it should be based on the mapping of where biodiversity values are, and if they're there, irrespective of what zone you're in or what development you're proposing, you should be subject to that .(NGO Expert 1 2015)

There were other interviewees however (*n* = 6, 18%), all with expertise in planning, who expressed the view that consideration and retention of biodiversity in urban contexts was impractical and, in some instances unreasonable, given the expectation people have to be able to develop such land.

> The capacity for you to be able to contain any kind of remnant vegetation [in the residential zone] that provides value is minimal (Strategic Planner 1 2015).

> Once it's the suburbs, it's gone. Natural values will be extinguished, whether it's through vegetation removal, initial development, subsequent development, redevelopment, domestic cats and dogs, whatever (Statutory Planner 1 2015).

> I think once you have zoned it residential you have almost lost the ability [to consider the values]. If it's closed residential or general residential it's almost a bit false to give people the impression that those communities and residential can coexist (Manager Planning 5 2015).

> It's hard to deal with, because as you get more and more development around it, it becomes more and more of a safety risk. So it's really hard. Or they want to put a road through and that's considered to be a priority … Maybe accepting losses in an urban areas is inevitable (State Expert 7 2015).

The negative pressures associated with urban development are seen to compromise the long-term viability of the population or habitat and render urban remnants as 'lost causes' (Cavin 2013 and Ives 2016). The extension of the urban-type zone exclusions across all schemes under the TPS legislates this perception that biodiversity has no place within urban areas. These exclusions are presented as a solution to potential conflict between biodiversity and development, when in actuality they ignore biodiversity in favour of development.

Despite the perception that there is no place for biodiversity in urban areas, research demonstrates urban areas can be hotspots for threatened species (Ives et al. 2016) and some threatened species can persist in small, degraded remnants (Kirkpatrick & Gilfedder 1995) or even highly modified environments (Ives et al. 2016). Ignoring urban biodiversity in the land use planning process therefore has the potential to lead to significant landscape-scale biodiversity loss (Dales 2011). Ignoring urban biodiversity also assumes biodiversity and development are mutually exclusive. This assumption results in lost conservation opportunities (Ives et al. 2016). However, as the following example of a residential subdivision at Hawthorn Drive illustrates, it is possible to achieve urban biodiversity conservation outcomes and enable development consistent with the zone purpose.

Hawthorn Drive was a 3.97 hectare property zoned Residential under the former Kingborough Planning Scheme 2000. The property was also subject to biodiversity-related code provisions where a proposed development impacted upon priority vegetation as defined in the code. TASVEG 3.0 mapped the site as agricultural, urban and exotic vegetation. However, Council data indicated the site as potentially containing high priority vegetation. As the code applied via text rather than a statutory map, field verification was required to determine whether protected vegetation was present and therefore whether the code was triggered.

This field verification identified the site as containing *Eucalyptus amygdalina* forest and woodland on sandstone (DAS), a threatened vegetation community under the *Nature Conservation Act 2002* and a high priority under the code (North Barker Ecosystem Services 2011). The site was also found to contain one of only 3 known populations of the endangered black-hood sun orchid (*Thelymitra atronitida*) in Tasmania, individual records of the endangered Chaostola skipper (*Antipodia chaostola* ssp. *leucophaea*), also with a limited distribution, and a number of other rare flora populations (North Barker Ecosystem Services 2011) (Figure 5.9).

The code therefore applied and the subdivision application required assessment against the code provisions. The outcome of this assessment was approval for 11 residential lots representing approximately 21% (0.87 hectares) of the site (Figure 5.9). The balance of the site (79%, 3.12 hectares) was protected in perpetuity as an offset via transferral of the land to Council as a bushland reserve. This offset required the development and implementation of a conservation management plan at the expense of the developer to address threats and maintain the threatened species habitat. The reserve has subsequently been rezoned from residential to environmental management.

While the total extent of biodiversity values was reduced as a result of the development, application of the code provisions, including offsetting, provided a mechanism for enabling limited development of the site in accordance with the zone objectives, while also improving the management and securing long-term viability of the biodiversity values across 79% of the site. This process is referred to as compensated net loss, or averted loss, as a level of acceptable loss is implicit in the offset ratio (Curran, Hellweg & Beck 2014). According to Maron et al. (2012), averted loss can only generate gains where, in the absence of the offset, the site would have been subject to ongoing decline. In this instance, refusing the proposal on the basis that the proposal would result in a loss in extent of the values would likely have been counterproductive. In the absence of any development, there would be no mechanism to secure the protection and management of the values unless the site was purchased for conservation. Consequently, the site would have remained zoned for residential development, unmanaged and subject to threats from inappropriate recreational use, dumping of waste, increasing weed infestations and inappropriate bushfire hazard management. Furthermore, if assessed under the SPPs, the entire site would have been developable with no consideration of the impacts on biodiversity. This example illustrates: (i) the importance of small urban remnants for biodiversity conservation; (ii) that development and biodiversity conservation are not necessarily mutually exclusive; and, (iii) the importance of biodiversity provisions applying via textual application in urban-type zones.

Figure 5.10 Biodiversity loss and biodiversity conservation outcomes at Hawthorn Drive, Kingston
Source: Audit of biodiversity loss, gain and risk within the UGA from 2000-2018, conducted in 2018 as part of this research. Data derived from Council records of development applications; satellite imagery; and, threatened species records from the Natural Values Atlas (Resource Management and Conservation 2009a, 2009b).

5.2.4 Zone versus code: is strategic planning the solution?

Given the risk to biodiversity located within urban-type zones, rather than apply the code to urban-type zones to address biodiversity impacts at the development approval stage, strategic planning is increasingly recognised as one of the most effective tools for ensuring adverse impacts are avoided and/or minimised (Asikainen & Jokinen 2009; Farrier, Kelly & Langdon 2007; Gordon et al. 2009; State of the Environment Committee 2011). When supported by appropriate decision-making frameworks and protection mechanisms, strategic planning enables landscape context, cumulative impacts and identification of areas to be protected via prohibitions on development incompatible with biodiversity conservation (Farrier, Kelly & Langdon 2007).

Strategic planning was identified as the solution to addressing biodiversity conservation by some interviewees (*n* = 8, 24%), predominantly with expertise in planning.

> The strategic process provides an opportunity to really name up what it is you want to look at (Statutory Planner 1 2015).

> If you've identified that an area needs protection then you can zone it in a way that's more likely to offer that protection. [Rather] than just relying on a particular development assessment being reliant on a code (NGO Expert 1 2015).

> If you've got better structure plans and settlement strategies and all of that, and you know where you want your settlements, then those areas are better protected (State Expert 7 2015).

> The minute we've made some of those strategic decisions, and reflected them into statutory planning controls I think is generally too late. If you have given somebody a development right to stick a house on a residential block, we don't go there anymore, there's no point in understanding whether there's threatened vegetation or not because the reality is we've lost it (Strategic Planner 1 2015).

> I'm a big advocate for the strategic assessments process, rather than trying to deal with it at the DA [development application]. I think it fits somewhere between the regional land use stage and the zoning stage. I would like to see a system that once land is zoned for a certain purpose, it's nearly a permit to proceed subject to some detailed assessment. But at the moment what we're getting is land zoned, say residential, but people are going to have to do a whole lot of on-site work to find out that maybe part of the site isn't developable anyway (Consultant Planner 1 2015).

> [The] problem is because you've got zones and an overlay that's trying to say, 'So, biodiversity is valuable' but I'm saying, 'But it's already zoned ready for development'. So we've got this conflict between planning provisions, depending on which way you look at it. If the strategic decision had been made in the first place that we're prepared to sacrifice that vegetation because we know we have to for that development, so let's get rid of it; or that vegetation is so valuable let's keep it, then let's not zone it that way. I just think we ought to have done more work in this space (Strategic Planner 1 2015).

While strategic planning represents an opportunity to identify areas for retention and protection, historically, strategic planning for conservation of biodiversity has been weak and the outcomes for conservation ad hoc (Bekessay et al. 2012; Ives et al. 2010; Robinson 2009). Furthermore, while strategic planning is fundamental to identifying areas for protection, the objects of strategic planning are delivered through the statutory instruments (Bates 2013). The primary mechanism for delivering strategic biodiversity conservation outcomes in Tasmania is the zoning stage (Southern Tasmanian Councils Authority 2011; Tasmanian Planning Commission 2017a).

> Zones should be your principle planning tool… Where the zone is not quite capable of delivering it we've got codes that can deal with specific hazards or issues. I don't think we've done that properly. What we've done is just zone it as we wanted to, and reflected historical zonings… What we should've done is actually looked at that and at the map and said, 'Okay, that area has got so constrained we shouldn't have actually zoned it that way in the first place' (Strategic Planner 1 2015).

> I think once you have zoned it residential you have almost lost the ability. If it's closed residential or general residential it's almost a bit false to give people the impression that those communities and residential can coexist. You really have to unfortunately make a decision at rezoning stage. If you don't, you've almost lost the game (Manager Planning 5 2015).

According to the s8A guidelines, the General Residential Zone should not be applied to land containing priority vegetation except where those issues have been taken into account and appropriate management put into place during the rezoning process (Tasmanian Planning Commission 2017a). While this sounds reasonable, relying upon the rezoning stage to achieve biodiversity conservation is based on a number of assumptions: (i) the data being used to inform the rezoning is reliable at the site-specific scale; (ii) the landscape is compartmentalised into distinct areas requiring protection or suitable for rezoning; (iii) there are mechanisms to secure the biodiversity conservation outcomes at the rezoning stage; and, (iv) biodiversity is static. Each of these assumptions is addressed below.

A spot rezoning of an individual site from one zone to another goes through a detailed assessment and advertising process generally requiring field verification and consideration of impacts on biodiversity. As such, the data is generally reliable at the site-specific scale. In contrast zone allocation undertaken as part of a whole-of-scheme review is a landscape-scale strategic process, often relying upon desk-top data which is not fit-for-purpose at the site specific scale (sections 5.2.2 and 6.1.1). As a consequence areas incorrectly mapped as not containing biodiversity are included in urban-type zones without regard to or knowledge of these values. Until the detailed assessments are undertaken at an appropriate scale based on field verified data, it is not possible to know what values are present and therefore make informed strategic decisions.

Zoning to avoid impacts on biodiversity identified as important for retention also assumes the landscape is compartmentalised in such a way that this is possible.

> At a really basic level, if you could identify 'this is where we want the houses and this we want to leave alone', then you're not getting pressure to go into those areas (State Expert 7 2015).

However, drawing meaningful zone boundaries around biodiversity within a fragmented landscape is not always possible. In landscapes where biodiversity does not intersect with areas under development pressure, zoning can be an effective tool for identifying areas important for biodiversity as there are no competing interests. Conversely, in more fragmented landscapes, particularly in areas experiencing greater development pressure, determining the line that represents the interface between biodiversity and development is more difficult. In these contexts, appropriate zone boundaries cannot be established in the absence of a specific proposal.

The process for determining the zone boundary concurrently with the details of a specific development is known as a s43A application, which enables a person to request the planning authority to consider an application for a permit which would not be allowed if the planning scheme were not amended as requested [s43A (1) of the former provisions of LUPAA]. While the s43A process generally relies upon field-verified data and enables appropriate zone boundaries to be identified, there is no mechanism at this stage in the process to secure biodiversity conservation outcomes and any outcomes are achieved via the application of the planning scheme requirements. Therefore, if the amendment involves rezoning to an urban-type zone which precludes code application, there are no applicable planning scheme provisions to enable consideration of biodiversity or secure the required biodiversity conservation outcomes necessary to justify the rezoning. In the absence of a Specific Area Plan (SAP),[28] the only way to ensure consideration of biodiversity and secure biodiversity conservation outcomes is to enable the code provisions to apply irrespective of the rezoning, which is fundamentally at odds with the position that biodiversity should be addressed at the strategic stage.

The strategic conservation planning process adopted in New South Wales provides a potential model for securing biodiversity conservation outcomes at the strategic stage. Under this process, offset requirements are negotiated between a planning authority and a proponent at the rezoning stage (State of New South Wales 2014).

Another potential mechanism for enabling protection of biodiversity at the strategic stage is the development of a State Policy under the *State Policies and Projects Act 1993*, and therefore implemented via the Resource Management and Planning System (RMPS) and planning schemes. The State Policy on the Protection of Agricultural Land 2009 (PAL) provides a potential model. PAL establishes principles for conserving and protecting prime agricultural land and limits development to where it is subservient to and required as part of an agricultural use. As State Policies are directly

[28] A SAP is the only mechanism currently available to provide explicit additional performance criteria for biodiversity and enable consideration beyond standard code provisions or in excluded zones. Therefore they are a useful mechanism for identifying areas to be retained and protected as part of future development proposals. However, the scope of these plans is limited to conserving biodiversity at the site specific scale and they require a high level of resourcing to develop.

linked to the strategic planning process via LUPAA, unlike biodiversity, through PAL the impacts of development on prime agricultural land are able to be assessed at the strategic stage.

> If we had a biodiversity policy, we'd have more reason to do some of that, because we'd have to assess all draft amendments against the State policy …. It's something I've been strongly advocating for … You've got that with agricultural land because of having that PAL policy … I've seen the PAL policy's worked really well. In some instances there's been backlash because it's been perceived as almost being too strong. But because that's worked so well, I think there is potential for having something like that with biodiversity (State Expert 7 2015).

However, even if the strategic process was able to secure conservation outcomes, determining whether biodiversity loss is, or is not, acceptable at the strategic stage assumes biodiversity is static and that the extent of the assessed impact at the time of the strategic assessment is the same as at the time of impact, which may be decades away. This assumption also ignores the dynamic nature of biodiversity and the inevitability of change, particularly under a changing climate (Latimer 2009; McCormack & McDonald 2014).

Therefore, even with a mechanism to secure biodiversity conservation outcomes at the strategic stage, there remains the need for a detailed current assessment at the development approval stage.

> I don't think you can avoid having those things in the scheme. I don't think, as good as any strategic work is, or as good as your allocation of zones is, there's always going to be impacts, or issues arise (Statutory Planner 3 2015).

The need for assessment at the development approval stage, even where a strategic assessment has been undertaken, is acknowledged in the New South Wales legislation, which still requires consideration of biodiversity at the development control stage, even where offsets are negotiated at the rezoning stage.

> In cases where a rezoning proposal is approved with a negotiated offset requirement (most commonly secured through a planning agreement), Councils are still required to consider impacts on biodiversity when a development application is lodged (State of New South Wales 2014:9).

Consistent with the findings in (Robinson 2009), a dual approach incorporating a mechanism to secure biodiversity conservation outcomes at the strategic planning stage, but also providing an opportunity for final assessment at the development stage to test the assumptions and outcomes from the strategic stage, is necessary to achieve substantive biodiversity conservation outcomes.

5.3 Conclusion

In this chapter I examined the extent of biodiversity code application and exclusions under the interim schemes and TPS, to identify where biodiversity is, and is not, able to be considered. Code application is variable under interim schemes, ranging from 0-100% coverage (section 5.1.1). Under the TPS, consideration of biodiversity will be required across all LGAs and consideration will be extended in some LGAs from threatened native vegetation communities to threatened species habitat and vegetation of local significance. However, under the TPS the total extent of native vegetation subject to biodiversity provisions could decrease from 3,340,651 to 2,600,422 hectares, representing a potential reduction in the coverage of biodiversity provisions for 76% (n = 22) of LGAs (Figure 5.5) (section 5.1.2).

The drivers of the reduction in code application are a reflection of: (i) the limited application of the code to priority vegetation only rather than native vegetation more broadly (sections 4.2 and 7.1); (ii) application of the code via a statutory map (section 5.2.2); and, (iii) an increase in exemptions and code exclusions within urban-type or agricultural zones (section 5.2.3). As the intention of these zones is to facilitate land use change, biodiversity controls are being removed precisely where biodiversity is at greatest risk.

A partial solution to the conflict between zone and code requirements is strategic planning and in particular appropriate zoning (section 5.2.4). While strategic planning plays an important role, the opportunities to achieve biodiversity conservation outcomes are limited by: (i) data reliability; (ii) complex mosaic landscapes; (iii) inadequate mechanisms to secure outcomes; and, (iv) the dynamic nature of biodiversity (section 5.2.4). The limitations of strategic planning demonstrate the importance of statutory planning instruments enabling consideration and assessment irrespective of zone.

In the following chapter I investigate the implications for biodiversity where it is able to be considered, examining the adequacy of current processes and rules for determining whether relevant concepts of biodiversity are present and impacted.

Chapter 6 - Concepts of biodiversity impacted by land use planning decisions

Chapters 4 and 5 demonstrated that concepts of biodiversity are only able to be considered in the land use planning process where (i) they are explicitly identified or named; (ii) there are relevant scheme provisions requiring their consideration, and (iii) their consideration is not excluded by limitations to code application or exemptions. These factors are the prerequisites for the rules having the *potential* to apply. However, provisions are triggered when values are identified as impacted. In this chapter I examine: (i) the information required to make the determination of impact, including the various sources of information (section 6.1); (ii) issues of interpretation and classification in determining the presence of values (section 6.2); and, (iii) the role of the suitably qualified person in the assessment and approval process and the extent to which they are compromised (section 6.3).[29]

6.1 Information sources

Once it has been determined that an activity constitutes development as defined under s3 of the *Land Use Planning and Approvals Act 1993* (LUPAA), a development application is required under s51. An application is categorised according to use class and then assessed in relation to the applicable zone and code provisions as either a permitted or discretionary application (section 3.3). The first stage in the assessment process, following lodgment of a development application, is to determine whether there is sufficient information to firstly determine whether relevant concepts of biodiversity are potentially impacted by the proposal, secondly enable assessment of the application against the relevant scheme provisions.

Under Clause 6.1.3 of the State Planning Provisions (SPPs) and Clause 8.1.3 of the interim planning schemes, in order to consider an application, a planning authority may request such further or additional information as the planning authority considers necessary or desirable to satisfy it that the proposed use or development will comply with any relevant standards and purpose statements in the zone, codes or specific area plan, applicable to the use or development. Under s54 of LUPAA, once a planning application becomes valid[30], the planning authority has 21 days within which to request this further information for a discretionary application, and 14 days for a permitted application (section 3.3).

[29] This chapter draws on the results of the survey of local government, the semi-structured interviews and the integrated analysis.

[30] Under s51 of LUPAA, an application is a valid application when it contains all relevant information required by the planning scheme applying to the land that is the subject of the application. Under the SPPS, an application is valid once the relevant fees have been paid and the following provided: (a) a signed application form; (b) any written permission and declaration of notification required under s.52 of the Act and, if any document is signed by the delegate, a copy of the delegation; (c) details of the location of the proposed use or development; (d) a copy of the current certificate of title for all land to which the permit sought is to relate, including the title plan; and (e) a full description of the proposed use or development.

> All the planning scheme provisions are based on what it actually is, not what we think it is. So yeah we need to be absolutely sure what it is to really be able to apply the scheme properly (Environmental Planner 2 2015).

When asked what level of information their local government area (LGA) usually required in undertaking an assessment of the impacts of a proposal on biodiversity, the most frequent response was desk-top analysis (*n* = 28, 82%), followed by Council mapping (*n* = 21, 62%), field based assessments by a qualified ecologist (*n* = 18, 53%) and a field based assessment by Council staff (*n* = 13, 38%) (Figure 6.1). Respondents from the North West particularly relied on desk-top analysis, with all respondents from these LGAs indicating they used desk-top mapping sources (*n* = 5). In contrast, only one respondent from North West identified Council mapping or a field verified assessment by an ecologist as information requirements. Whereas, Southern LGAs identified Council mapping (*n* = 17, 71%) and field verified assessment by an ecologist (*n* = 15, 63%) as standard levels of information required (Figure 6.1).

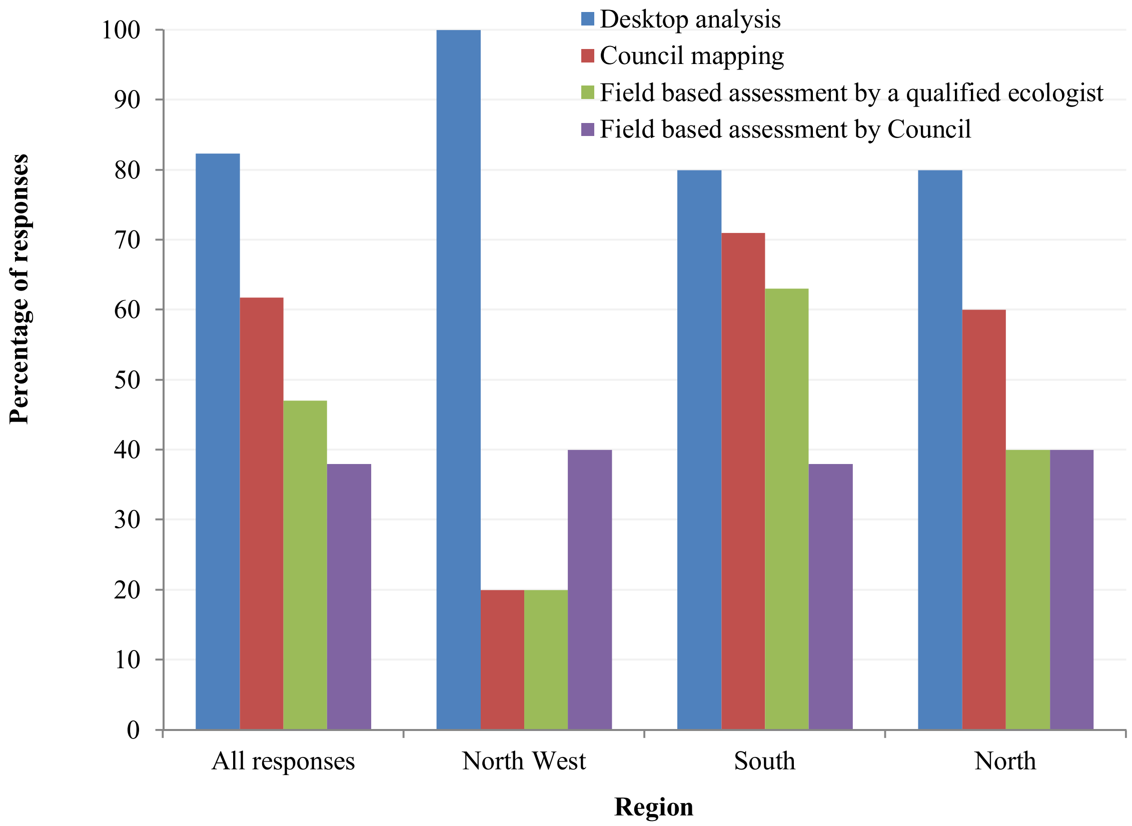


Figure 6.1 Survey response by region to the question:
What level of information does your Council usually require to undertake their assessment?
Source: Survey of all Tasmanian Councils conducted in April 2014 as part of this research.

6.1.1 Desktop analysis using publicly available data

The most common information source used to ascertain whether a concept of biodiversity is potentially impacted by a proposal is publicly available desk-top data (Figure 6.1). There are numerous decision support tools available in Tasmania, including the Natural Values Atlas (NVA) (Department of Primary Industries, Parks, Water and Environment) (DPIPWE), the LIST (DPIPWE), the Threatened Species Link (DPIPWE), the Conservation Information System (DPIPWE), the Biodiversity Values Database (Forest Practices Authority) (FPA), the Habitat Context Assessment Tool (FPA) and the Threatened Fauna Advisor (FPA). These tools provide information on the potential contribution that native vegetation makes to biodiversity. While the way in which the data are presented and reported differs depending upon the audience, these State decision support tools overlap in their use of base data sources and none have been developed specifically for the purpose of statutory land use planning.

These data sources are not fit-for-purpose at the scale of an individual development (sections 5.1, 5.2 and 5.5) and should not be relied upon to indicate the presence or absence of a value in the absence of field verification by a suitably qualified person.

> The map is only as good as the accuracy of the map. And there are inherent problems with some of the mapping of some of the values, threatened vegetation communities being a really good example (State Expert 1 2015).

The survey bias pertains to threatened species records and, therefore, the NVA (section 5.5).

> If we look at say the Natural Values Atlas, which is what we use a fair bit and to some extent underpins some of the overlays that we're talking about, because that's the central repository, I mean it's pretty clear that is fairly hit and miss in terms of … some of the data. There are inaccuracy issues … [and] some parts of the states have been very highly surveyed, and some have almost no survey at all (State Expert 4 2015).

Despite this survey bias, which is well understood by experts in the field, the NVA is often relied upon by planners, consultants and planning authorities to determine whether there are threatened species on a site,

> to the point where if they see if there's a gap they would interpret that as, 'Go ahead' … interpreting the absence of data as someone's been there and looked and there's nothing there so they just carry on (State Expert 8 2015).

> I've become aware recently of a few regulators that are already making decisions around what you pretty much call an overlay, and it just doesn't work because the data in something like the NVA was never intended to be used that way (State Expert 4 2015).

While the NVA is a useful tool to assist decision makers identify where threatened species have previously been recorded, the database is 'really just a trigger to get you looking and seeing what is really there on the ground' (Manager Planning 4 2015).

> I use NVA reports as a very first cut because I know often they're not right, but often they've not been ground trothed. A lot of properties have never been surveyed. That said, TASVEG 3 and the NVA are starting points (NRM 1 2015).
>
> The NVA really is a preliminary desktop tool knowing that it's got all sorts of issues, but it's still the best thing we've got, but then we just tend to use that as a preliminary assessment to get an on-ground survey (State Expert 4 2015).

As the limitations of the NVA and TASVEG highlight, while decision support tools are important for first pass assessments, field verification is often critical in identifying whether an area is or is not important for biodiversity.

> The map and known sites is a great starting point but that's not a guarantee. …At the end of it I think you need to go out there. And I think that would hold true with Councils or anyone assessing values, there's no substitute for actually going out and looking (State Expert 6 2015).
>
> If it's trying to get the best outcome, then it's best to look at what's the reality, not what someone's drawn on a map (Ecological Consultant 2 2015).

6.1.2 Council data

Some LGAs also have developed their own in-house Council geographic information system (GIS) systems, developed partially in response to the limitations of State-based datasets (section 5.2.2). These in-house decision-support tools utilise some Council data sets and modelling and are more specifically developed for assisting in land use planning decisions. Notwithstanding, these tools still rely predominantly on State data.

> In terms of the model, the model was based on threatened native veg communities, EPBC listed communities, and then how to connect it all up in terms of what TASVEG had mapped (Manager Planning 2 2015).

Even where the mapping utilises data derived from field verification, the scale of this verification means the mapping is still not necessarily reliable at the site specific scale. For example, field verification of vegetation mapping undertaken in the Huon Valley and Kingborough LGAs predominantly relied upon identification of the dominant canopy species using binoculars from public vantage points such as roads and tracks, supported by aerial imagery and geology maps. Consequently, this mapping is useful for identifying the likely dominant or sub-dominant eucalypt species and are often more reliable than TASVEG in attributing the correct TASVEG classification. However, these data sets should not be relied upon to determine the vegetation community present or other values associated with this vegetation type, such as threatened species habitat or lack thereof.

Therefore, while both State-based and local decision support tools and associated data sets are useful to indicate what *may* be present on a site, a field survey is required to ground-truth the findings of the desktop assessment and determine when values are present (Natural and Cultural Heritage Division

2015a). 'The stuff that emerges when the person goes on the ground is just so critical' (State Expert 3 2015).

6.1.3 Field verification

Field verification is more commonly carried out by a suitably qualified person (53%, n = 18) engaged directly by the applicant rather than by the statutory planning authority (38%, n = 13) (Figure 6.1). When asked how often their Council relied on the advice of ecological consultants engaged by the applicant to assess the impacts of use or development on biodiversity as part of the development approval process, 56% (n = 19) indicated they did so routinely and 12% (n = 4) indicated they always did so.

Field verification is generally required when the results of the desk-top analysis indicate a value may be present. In many instances it will be self-evident where there will be an impact on biodiversity and this impact requires assessment.

> If there is desktop evidence of natural values that will be disturbed then a field based assessment by a qualified person may be required (Survey Respondent).

In such circumstances, an application may already be accompanied by an assessment by a suitably qualified person. Depending upon the biodiversity values present, this suitably qualified person is likely to be an ecologist but may also be an arborist or a species specialist. Where the information is not submitted with the application, the planning authority has to make a judgement call about when to request an assessment by a suitably qualified person. Given the current limitations of desk-top data, it is the view of some that,

> with natural values, it is always going to require a survey, you're not going to make a decision without a survey because you just don't know what's there – unless the government has the resources to go out and do really good mapping (State Expert 5 2015).

Whereas for others, making the judgement call about when to require field verification by a suitably qualified person requires more consideration.

> Obviously you need that information before you can say whether this particular code applies or not. Generally those sorts of requests for natural values assessments haven't been challenged. But I am fairly careful about when I do and when I do and when I don't request those (Environmental Planner 2 2015).

In the case of threatened species, the trigger for further assessment is often 'known records, but also known habitat, and the likelihood of a species being in those habitats'(State Expert 8 2015). For forest vegetation, in some LGAs mapping, aerial imagery or local knowledge indicating native vegetation may be impacted can be sufficient to require on-ground assessment.

Determining when field verification is required can be more complex for non-forest vegetation as significant communities are less readily discernible from aerial imagery than forest communities. In one LGA with native grasslands, the approach is:

> If it's not urban, we pretty much always instantly ask for flora and fauna assessments (NRM 4 2015).

However comments by interviewees from all areas of expertise and within both State and local government and non-government organisations (NGOs) highlighted that requiring field verification was not always justifiable and sometimes considered too onerous (n = 6).

> If it's an application where you're going to be asking some fairly standard things for a natural values assessment, then that's not really an issue. But certainly for some of these other properties where it might be touch and go and it looks okay on a desktop review, you might not be able to justify asking for that on-ground survey (Environmental Planner 2 2015).

> We know we're going to get some reluctance from people to actually go and do that because: (i) the people aren't there to provide an assessment; and, (ii) they've got this fear that things will go pear-shaped and they're not going to be able to develop a house on the block (Manager Planning 3 2015).

> Councils are making things more costly and more complicated by requiring [applicants] to go to external consultants for more and more and more (NGO Expert 3 2015).

> There's just never going to be that political 'will' to make every single house or whatever go and spend ten grand on a survey (State Expert 5 2015).

> It becomes a question of ... overkill... what's reasonable... If I can get a local guy who's knowledgeable and can go and have a look... and design around the value without the full bells and whistles assessment, we're getting a good outcome. It's not easy to get specialists (NRM 6 2015).

In response to this perception that field verification by a suitably qualified expert is not justifiable, some LGAs provide a level of in-house field verification. With an average of 38% (n = 13) of respondents identifying in-house field verification as one of the levels of information relied upon when undertaking an assessment, there was little variation in survey responses between the regions (Figure 6.1). One survey respondent qualified this by clarifying that field assessments by Council staff were only undertaken where there were inconsistencies in available information and time permitting (Survey Respondent). Similarly, an interviewee highlighted that in-house field verification was sometimes undertaken where they have capacity and getting a suitably qualified person would be costly.

> But that said, we do sometimes help people out... because if you literally just want to put a driveway up somewhere, within half an hour she can tell you whether something's there or not. Whereas if you were to get a consultant to come up from Hobart it will cost a couple of thousand

> dollars... it depends on their attitude but we do a lot of stuff like that, we try to help people where we can within our capacity (NRM 1 2015).

However, the capacity to do in-house verification depends upon the level of resources and skills within the LGA as well as the location and complexity of the proposal.

> And you know while I can do that to a degree myself, I certainly don’t have the same level of expertise as most of the consultants out there (Environmental Planner 2 2015).

> It's Council's normal process to rely on those reports because the whole basis of the system relies on those reports. We don't have a significant amount of environment or management expertise in-house, so we have to rely on those consultants’ reports as part of our assessment (Manager Planning 5 2015).

> With our priority habitat mapping, our standards say 'in all circumstances' you need to go and get a specialist report. But with the next safety net threshold there's the option of just getting an internal assessment if you've got those resources. But you've also got the ability under the Act to ask for a report if you need one. So those Councils that don't have in-house resources can still ask for a report to see what it is (Manager Planning 2 2015).

> Some Councils don't even have NRM people working for them so they're not going to know. That's why you have the [ecological] assessment... by a recognised practitioner (NRM 5 2015).

> That's where it's a really delicate balancing act between your consultant ecologists and ... how much advice you take, how much in-house knowledge you have. Some of the large Councils have pretty good in-house knowledge. I suspect those without a natural resource management officer or a vegetation or biodiversity officer there's very little (Manager Planning 2 2015).

The ability of the planning authority to require field verification by a suitably qualified person is therefore often central to establishing what values are potentially impacted by a proposal and to what extent.

6.1.4 When is reality, reality and when is the map reality?

However, the ability to require field verification by a suitably qualified person is limited by the provisions of the statutory planning scheme. Furthermore, these provisions varied depending upon whether they apply via a statutory map or textual application.

In the Northern interim schemes, the requirements for a flora and fauna report varied depending upon whether the code is triggered by inclusion within the statutory priority habitat map or is triggered by textual application. Where a proposal involves clearance or disturbance of native vegetation within an area shown on the planning scheme maps as priority habitat, and there is no certified Forest Practices Plan in place, this clearance or disturbance must be assessed against the performance criteria. Consistent with Clause E8.6.1 P1, demonstrating compliance with these criteria requires a flora and fauna report prepared by a suitably qualified person. Therefore, where the code applies via a statutory map, field verification is limited to where the area impacted is identified as priority habitat in the map, irrespective of whether the site contains priority habitat in reality.

In acknowledgement that the base data is indicative only and values are likely to exist outside the statutory map, the Northern interim schemes (Group 1) (excluding Launceston) provide a trigger for textual application of the code for native vegetation broadly, regardless of whether this vegetation is mapped as priority habitat or not (section 5.2.2). While demonstrating compliance with this performance criterion does not explicitly require a report by a suitably qualified person, it provides for it.

> That's not to say that those things didn't exist elsewhere … That's where the secondary clause comes in and that's the safety net … when it's not mapped as threatened, you still go in and have a look at what's there (Manager Planning 2 2015).

Within the Launceston Interim Scheme, rather than textual application for the removal of native vegetation generally, the code also applies where a flora and fauna report prepared by a suitably qualified person identifies that the removal of native vegetation will have a significant impact on priority vegetation communities.

While the North West interim schemes (Group 3) do not include any specific provisions providing for an assessment or report by a suitably qualified person, the code is applied via textual application and therefore does not preclude field verification in the way a statutory map can.

Clause E10.5 of the Southern interim schemes with biodiversity-related codes (Group 2) provides a definition of a suitably qualified person specifically in relation to biodiversity. An assessment by a suitably qualified person may be requested where a proposal involves clearance and conversion or disturbance of native vegetation within a Biodiversity Protection Area. However, where a proposal is located outside a Biodiversity Protection Area, what exists on the ground is irrelevant and beyond consideration.

As with the Southern interim schemes in Group 2, under the SPPs, the biodiversity code provisions will be applied by statutory map only.

> So generally it will be that the map is what triggers the additional assessment process… the trigger is the map as opposed to the identification of a particular species being within a site (NGO Expert 1 2015).

Unlike the Northern interim schemes, no safety net provision exists in the Southern interim schemes or the SPPs. Therefore, once the SPPS come into effect, what exists on a site outside the overlay is beyond consideration. As the overlay itself is based on predominantly desk-top data and known records, this approach perpetuates a bias towards areas which have already had some survey effort and limits the ability to survey in areas where there has been little to no survey effort.

The ability for decisions to be made based on what exists rather than what a dataset indicates exists is further constrained under the SPPs by the lack of specific provisions providing for an assessment or report by a suitably qualified person.

6.2 Problems of interpretation and classification

The importance of field verification in determining when values/concepts are present, particularly by a suitably qualified person, has been established. Where field verification by a suitably qualified person is justified, it may seem reasonable to presume that person can be relied upon to determine whether or not the site contains relevant concepts of biodiversity, such as a threatened vegetation community, a threatened species or habitat for that species.

> It would be lovely if it was black and white and you could rely on an environmental consultant. It's not that you can't rely on them because they're being dodgy or uninformed or uneducated. I think it's that the environment is a difficult thing to interpret, so whether something is a vegetation community or not, doesn't have very strict guidelines around that (NRM 2 2015).

However, identification and assessment of the impact of a development on biodiversity has a strong subjective element and relies upon a degree of interpretation (Burgin 2008; ten Kate, Bishop & Bayon 2004). Classification of vegetation communities, determining whether a site is important for a species where there is no evidence of the species being present and incorporating new knowledge are all areas where interpretation is required.

6.2.1 Complexities of classification - which patch is what community, is it a threatened community and when is it not a community at all?

Within land use planning in Tasmania, vegetation communities are classified using the TASVEG classification system (Kitchener & Harris 2013).[31] In addition, the criteria for what constitutes a threatened community are agreed, a list of such threatened native vegetation communities has been established and the objective of conserving these communities enshrined in Commonwealth and State legislation (section 3.1). On this basis it could appear reasonable to assume that, through the process of field verification, a suitably qualified person could simply attribute the appropriate vegetation community using the TASVEG classification system. The vegetation communities that were impacted and communities of conservation significance would be identified.

However, vegetation communities exist on a continuum and where one community stops and another starts requires a judgement (Kirkpatrick et al. 1995; Kitchener & Harris 2013). 'Where there is not a

[31] The TASVEG classification system is the basis of vegetation mapping in Tasmania. It underpins legislated native vegetation conservation provisions, policy and monitoring at the State and Commonwealth level (Department of Primary Industries Parks Water and Environment 2013b). This classification system is fully described in the accompanying technical manual - From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation (Edition 2), which includes an Intersectional key which provides a guide to the most commonly observed structural form of vegetation included within each unit (Department of Primary Industries Parks Water and Environment 2013b; Kitchener & Harris 2013)

clear demarcation in the vegetation, drawing a line between communities is necessarily subjective, particularly where vegetation forms a successional series or where there is a gradual transition from one vegetation community to another over an environmental gradient' (Kitchener & Harris 2013:5).

> So we are relying on the schedule of vegetation communities and the *Nature Conservation Act* and the interpretation of a qualified person to say it's that (Manager Planning 4 2015).

> The TASVEG system is definitely imperfect. It's imperfect by the classifications, and it's imperfect by how they get interpreted by the different people (Ecological Consultant 1 2015).

Therefore classifying and subsequently identifying vegetation communities is a matter of interpretation and can be contested where different suitably qualified persons classify the same patch of vegetation as a different community. In some instances this difference in expert opinion results in the community being considered as threatened by one expert and not by the other.

To illustrate, there is a patch of vegetation within the Kingborough municipality that is mapped as *Eucalyptus obliqua* dry forest (DOB) according to TASVEG v3.0 (Department of Primary Industries Parks Water and Environment 2013a). The same patch of vegetation was identified by a suitably qualified person as *Eucalyptus ovata* forest and woodland (DOV) as part of a Kingborough mapping project, which involved a level of field verification but not a detailed on-ground survey. The vegetation was then mapped as *Eucalyptus viminalis* grassy forest and woodland (DVG) based on a detailed on-ground survey as part of another Council project (Knight 2011). A third suitably qualified person subsequently mapped the vegetation as *Eucalyptus viminalis* shrubby/heathy forest (DVS) based on a separate detailed on-ground survey for a rezoning and subdivision application (Environmental Consulting Options Tasmania (ECOtas) 2013). Following advice from the Policy Conservation Assessment Branch of DPIPWE, the patch was determined to be most appropriately classified as DVG. DVG was listed at the time as a high priority under the Kingborough Planning Scheme 2000 and therefore based on this classification, the vegetation was provided with a level of statutory protection. Similarly, DOV is a listed threatened native vegetation community, and therefore, if this classification had been attributed, the vegetation would have been a high priority for conservation. Classification as DVS would have precluded consideration as, under the provisions in effect at the time, this vegetation community was not listed as being of conservation significance under Commonwealth, State or local provisions.

The issue here is not that any of the suitably qualified persons undertaking the field based classifications are necessarily inherently incorrect. The issue is that the classification of vegetation is a largely artificial process based on a combination of structure, physiognomy, dominance, floristics and in some instances environment such as substrate (Kirkpatrick et al. 1995; Kitchener & Harris 2013). The TASVEG classification specifically is a hybrid of floristic and physiognomic characteristics derived from varying sources that are mappable at a scale of 1:25000 (Kitchener & Harris 2013).

TASVEG is therefore limited to mappable vegetation communities. However there are also plant communities which are described but not mapped and differentiating these communities is important for conservation (Kirkpatrick et al. 1995). These communities represent a subset of the broader vegetation type intended by the mapping unit and are identified within the TASVEG description as floristic communities (Kitchener & Harris 2013). There is therefore diversity and variation within some mappable communities which is not captured by the TASVEG classification system but is important to identify as part of field verification. Capturing this variation is especially important when the floristic community is threatened but the broader TASVEG unit is not. For example, *Notelaea – Pomaderris - Beyeria* forest is a threatened native vegetation community within the broader TASVEG community of broad-leaf scrub, which is not threatened.

There are also TASVEG vegetation communities which could be classified in a number of ways depending upon substrate and this classification also has implications for the conservation status of the vegetation community. For example, according to the TASVEG key, a patch of vegetation dominated by *Eucalyptus amygdalina* could be classified as one of five vegetation communities depending upon substrate (Kitchener & Harris 2013). Determining the underlying substrate seems relatively straight forward. However, in some instances distinguishing one community dominated by *E. amygdalina* from another is more complex than simply looking at the underlying geology. To illustrate, both *E. amygdalina* forest and woodland on sandstone (DAS) and *E. amygdalina* coastal forest and woodland (DAC) have sandy soils and a heathy or shrubby variant (Kitchener & Harris 2013). Distinguishing between them then becomes a matter of interpretation of whether the sandstone outcrops are sufficiently conspicuous, the understorey is sufficiently open and uneven in height, and there are more species tolerant of dry situations (Kitchener & Harris 2013). This raises an interesting question about whether or not some TASVEG classifications are clear enough to repeatedly differentiate one community from another; and, whether it is realistic to expect consistency in classification of vegetation in all instances, as statutory land use planning does, especially given the final classification has very real implications for the conservation of the patch. In the example provided above, classifying vegetation as DAS as distinct from DAC is the difference between it being a threatened vegetation community and therefore worthy of consideration, or not. The complexity of classifying vegetation communities within a land use planning system that assumes biodiversity is black or white has the potential to undermine substantive biodiversity outcomes as biodiversity is reduced to legal definitions and technicalities.

Another classification issue with the potential to undermine biodiversity conservation is that, while there are detailed descriptions of the characteristics of vegetation communities in Tasmania, there are no quantifiable criteria for integrity thresholds. How much native understorey does a patch need to be a community? How many canopy trees? How big does the patch need to be? What condition does it need to be in? Kitchener and Harris (2013) provide some guidance, recognising that, regardless of whether a vegetation community has been captured by TASVEG mapping, patches (or contiguous patches) of vegetation as small as 0.1 ha may be valuable for communities of high conservation significance where they are assessed as viable. An additional step has also been introduced in the intersectional key of TASVEG for classifying vegetation as modified land where native tree canopy 'persists but the understory has been cleared and/or replaced with exotic species and is not expected to return a native understorey in the medium term (~50 years)' (Kitchener & Harris 2013:3). The purpose of this step is to ensure that 'trees (regardless of cover) occurring as isolated individuals or small copses over, for example, improved pasture are not automatically keyed out to a native vegetation community' (Kitchener & Harris 2013:3). This provides greater clarity than previous versions of TASVEG in terms of when a patch of trees is not a native vegetation community. However, there are no explicit criteria in Tasmania, such as the per cent of the total perennial native understorey plant cover that needs to be present, for a patch of trees to be classified as a native vegetation community as distinct from modified land, or how to determine whether the native understorey could return in the medium term. In the absence of such criteria there remains considerable room for different interpretations, resulting in situations where one suitably qualified person classifies a patch of vegetation as a native vegetation community and another suitably qualified person classifies the same patch as modified land.

> There seems to be a degree of difference with how people interpret when it is a community and when it's not. So I think that needs to be clearly defined (Consultant Planner 1 2015).

In contrast, other jurisdictions provide quite clear and measurable criteria for a community. For example, Clause 72 of the Victorian Planning Provisions define native vegetation as plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses (Department of Environment Land Water and Planning (Vic) 2015). To further clarify this broad definition, section 2.2 of the Biodiversity Assessment Guidelines delineate native vegetation, including dead native vegetation, into the following two categories for the purposes of vegetation removal regulated under the VPP:

1. remnant patch, which is either:
    - an area of vegetation, with or without trees, where at least 25 per cent of the total perennial understorey plant cover is native; or
    - any area with three or more native canopy trees where the canopy foliage cover is at least 20 per cent of the area.
2. scattered tree, which is an indigenous canopy tree that does not form part of a remnant patch (Department of Environment and Primary Industries (Vic) 2013, 2015).

> What constitutes a patch of native vegetation in Tasmania, there's no actual cut off is there, whereas in Victoria there's a very clear definition. Twenty-five percent of the perennial understory has to be native. So that's it, not negotiable. You can literally get a quadrat or a really rigorous sampling regime that's kind of repeatable and different people can go to that site and

> come up with the same result. So what I see is a lot more of the vegetation in Victoria actually would be considered native vegetation to here (Ecological Consultant 4 2015).

Similarly, under the *Environment Protection and Biodiversity Conservation Act 2002* (EPBCA), threatened ecological communities are ascribed key diagnostic characteristics and condition thresholds specific to each listing to assist with determining when a patch of vegetation does or does not satisfy the criteria for a particular listed community.

The lack of criteria for a community creates uncertainty on the application of land use planning regulations. Establishing quantifiable criteria for a community is critical. Given the basis for the listing of vegetation communities under the *Nature Conservation Act 2002* (NCA) is that they are in fact threatened, and given the underlying objective of ecologically sustainable development (ESD), a precautionary approach that errs towards criteria and thresholds that are over rather than under inclusive has merit.

6.2.2 Lack of presence does not equal absence

Just as there are interpretation issues around classifying vegetation communities, similarly there are complexities associated with identifying threatened species and their habitat. It is well accepted that fauna are mobile and may not be present at the time of survey. Some plant species, such as geophytes and annuals, are visible for only part of the year. A common example is orchids. As acknowledged in the Threatened Orchid Recovery Plan (Threatened Species Section 2006), assessment of orchid species distribution and populations over time is fraught and while,

> [r]ecords provided by enthusiasts and professional botanists and specimens lodged at herbariums provide insight into the extent of occurrence of taxa and current land use provides an indication as to populations that are likely to have become extinct… as a consequence of patchy and ephemeral occurrences and the lack of permanent monitoring, knowledge of the distribution of threatened orchid populations in Tasmania at any given time is generally incomplete.

Annual plant species can also emerge in different locations from year to year depending on where conditions are favourable. As acknowledged by a number of interviewees, the challenge of the ephemeral above ground appearance of some species is exacerbated by the constraints of the development approval process, where timeframes for survey are driven by the proponent and the statutes. As one interviewee stated:

> So what you would think of as good value Midlands grasslands country… they sent him there end of November last year, and winter was really dry, we didn't have any [rain], and it’s like well all the values you’re looking for, you know aren’t going to be there, because all the orchids and stuff would have finished [flowering] (NRM 4 2015).

Similar issues with species surveys were highlighted by another interviewee:

> That's actually one of the big problems I've had with the consultant reports is inevitably … they'd recommend that they do a different survey at a particular time of the year because of the potential likelihood for some other kinds of species. But, we don't get that report. Or because of the statutory timeframes, we have to deal with it prior to being able to go and investigate these other things (Strategic Planner 1 2015).

Relying on positive observation of a flora species is also problematic as some species may be present but incredibly difficult to detect. For example, some native grasses can be challenging to identify to the species level unless they are at a particular stage in their growth.

Fauna species can also be elusive and can remain undetected despite thorough searches. To illustrate, the endangered Chaostola skipper (*Antipodia chaostola* ssp. *leucophaea*) is a very elusive species with a low population density and a very limited distribution (Threatened Species Section 2012a, 2016a). On a number of occasions, detailed surveys have failed to find any evidence of the species. However follow up surveys have revealed the species as present, even in low density habitat not considered likely to support it. Given how difficult it can be to detect this species, its status as endangered and its reliance on private land in areas identified for urban growth, the management advice for this species is that habitat should be retained irrespective of whether or not the presence of the skipper can be confirmed (Threatened Species Section 2012a, 2016a).

Another issue with relying on presence of a fauna species for an area to be important is that some species are landscape-scale species, which are highly mobile or have large ranges, utilising an area in some seasons but not others. For these species, sites containing potential habitat may not be important or occupied at a given point in time, but could be in others. According to one interviewee, two landscape-scale species are particularly problematic, the swift parrot and the Tasmanian devil (NGO Expert 2 2015).

> The swift parrot … is totally problematic in terms of planning because it's here today but gone tomorrow. It follows the resource at breeding time, which is flowering eucalypts, it can be found in gardens and it's got a whole range of requirements (NGO Expert 2 2015).

For this species, historic records and known nesting sites may not be as important as maintaining the suitability and configuration of breeding habitat across the landscape (Webb 2008; Webb, Holdsworth & Webb 2012). So there may be no evidence of swift parrots utilising particular areas for many years or even at all, but this does not necessarily mean this habitat will not be utilised by this species in the future (Webb 2008). Given the spatiotemporal variation in the availability of swift parrot breeding habitat, protection of this species therefore requires management or reservation of suitable forest stands with old-growth characteristics across the landscape, even where the species has not been observed nesting in the area (Webb, Holdsworth & Webb 2012).

The Devil is difficult to manage as it ranges across large areas, utilises a wide range of habitats but has specific breeding requirements which can occur in most vegetation types, including urban areas (Natural and Cultural Heritage Division 2015b). Consequently almost anywhere has the potential to be habitat for this species.

> As with most animal species, it is nearly impossible to prove devils are absent from an area. High confidence in local absence can only be obtained from intensive surveys (Threatened Species Section 2016c).

For these reasons, assuming a species has to be present in an area for that area to be important is highly problematic and has the potential to impact on the viability of individual threatened species and threatened species populations. ‘Absence … at any point in time does not mean that that species will not come back to that location or that area or will not need that resource in the future’(NGO Expert 2 2015). This creates a conundrum for land use planning, which is striving for certainty in an uncertain world.

> On the one hand, from a conservation perspective, absence of a species does not mean it is not there and, therefore, that habitat still remains important. You can apply the precautionary principle. But on the other side of the story, if you are a developer or a landholder that wants to do something, it's hugely frustrating to be told that your piece of land doesn't have the species today but it could be there in the future and therefore you can't do what you want to. And that creates conflict, it creates uncertainty, it just throws up all sorts of problems for everybody, and it's a very difficult space to work in. And that's what I guess local government and State planning need to be able to cater for (Statutory Planner 1 2015).

Given the issues associated with assuming lack of presence equals absence, habitat for a species is often used as an indicator of the potential importance of an area for a particular species. What is important to consider is not just ‘known records, but also known habitat, and the likelihood of a species being in those habitats’ (State Expert 8 2015). Therefore, in determining whether a site is important for a species, in many cases the presence of habitat rather than the positive observation of the species should be the key diagnostic criteria.

6.2.3 What habitat? Habitat for what?

As illustrated by the species profiles above, habitat is species and site specific and scale and context dependent.

> It’s a scale thing and you have to manage species at the scale at which is relevant and for most species (State Expert 5 2015).

For some species, a single tree in a particular context might be considered critical to the viability of a population, whereas the same species of tree with the same characteristics in another context may have no conservation significance for the species. For example, according to current best practice management advice, even individual *Eucalyptus viminalis* (white gum) trees, including saplings, are very important for retention where they are within or adjacent to a known forty-spotted pardalote colony (Bryant 2010; Threatened Species Section 2012b, 2016b), whereas the same species of tree located more than 3 km from a known colony is not considered critical for conservation (Threatened Species Section 2012b).

Therefore, determining whether a site contains habitat requires agreed definitions and guidelines on habitat at the level of the individual species or group of species. And yet, only 10% of planning schemes define habitat (section 4.1.1). Where habitat is defined it is a generic definition with no consistency or agreement across Schemes. Similarly, under the SPPs the concept of significant habitat is adopted but not defined.

Guidelines for natural values surveys have been developed by the State Government (Natural and Cultural Heritage Division 2015a). Development has also commenced on species specific management prescriptions for use in land use planning, such as for the Tasmanian Devil (Natural and Cultural Heritage Division 2015b).

> So with CAS [Conservation Assessment Section of DPIPWE] we're working to do some prescriptions anyway to define those things that are more widely applicable than just forestry… It's brilliant that the FPA have done theirs; that's how it should be definitely and the idea that everyone sort of feeds into that as there's some sort of independence that ensures there's no pressure from the consultants to do the wrong thing (State Expert 3 2015).

Despite their benefits, no further guidelines have been developed to July 2018. Therefore, ultimately 'it comes down to someone making a call on whether they think that's going to be a likely/potential habitat for the species' (State Expert 8 2015).

In contrast, the Forest Practices System (FPS) incorporates endorsed management prescriptions for 77 fauna species or groups of fauna species which not only define what significant habitat is, but what it is for different species, how to identify it on the ground and what to do if it occurs on a site (Forest Practices Authority 2014a) (section 3.1.2). For example, under the FPS, a patch of *Eucalyptus obliqua* forest is not of conservation significance as a plant community. However, if it has mature hollow-bearing trees within the potential breeding range of the swift parrot and is located within 10 km of flowering *Eucalyptus globulus* or *Eucalyptus ovata* trees with a diameter > 40cm, it is considered to be significant swift parrot habitat (Forest Practices Authority 2014b; Forest Practices Authority & Threatened Species Section DPIPWE 2012; Saunders & Tzaros 2011). Under many statutory planning schemes this vegetation would only be recognised as *Eucalyptus obliqua* forest and of very limited conservation value, and its importance as significant swift parrot habitat not recognised.

Furthermore, within the FPS, if the Forest Practices Officer wants to deviate from the habitat definitions and guidelines, there is a process of referral to the FPA, who make the final call. Similarly, the FPS has the Forest Botany Manual and a referral process in relation to potential impacts on significant vegetation types and plant species. Therefore, the final interpretation of relevant concepts of biodiversity is determined by the regulator not the suitably qualified person, in this case the Forest Practices Officer.

6.2.4 Shifting goal posts, changing knowledge and a changing climate

In some instances, a shift in knowledge means that species that were not previously considered at risk suddenly become a high priority for conservation. Two recent examples are the forty-spotted pardalote and the Tasmanian devil.

Until a conservation assessment of the forty-spotted pardalote was undertaken in 2009, there was an assumption that the species population was stable and, given the high level of reservation of known populations, was in no immediate danger of extinction (Bryant 2010). The assessment in 2009 found a significant population decline and concluded that, if the decline continues at its present rate, it would be sufficient to result in the extinction of the species within the next ten years (Bryant 2010). These findings have resulted in a shift in impact assessment through the land use planning process and the importance of retaining habitat, including single trees, as part of development proposals (Threatened Species Section 2012b).

Similarly, prior to the detection of the devil facial tumour disease, while listed as vulnerable under the Threatened Species Protection Act 1995 (TSPA) and EPBCA, the Tasmanian devil was not considered to be in immediate danger of extinction. The population has now declined by more than 80% since the mid-1990s and has been upgraded to endangered under both State and Commonwealth threatened species legislation (Threatened Species Section 2016c).

> The devils are probably an extreme example but it’s really not very long ago with Tasmanian devils weren't a planning issue. And now they are probably one of our biggest issues (Int2 2015).

In other instances, while the species may have been of concern for some time, shifts in knowledge of the species or its habitat requirements have resulted in changes in where management of the species is required. Returning to the swift parrot, prior to the 2007/08 breeding season, this species was thought to be a dry forest species (Webb 2008). Therefore, extensive areas of *Eucalyptus globulus* in wet forests, and mature habitat in proximity to this foraging resource, were not considered important for the species. During this breeding season the species was found to forage in wet forests, increasing the extent of habitat important for the species.

Changing knowledge about values has implications for land use planning decisions and can result in the need for goal posts to shift to accommodate new knowledge. In the case of the forty-spotted pardalote, the goal posts shifted to recommend consideration of the loss of individual white gums within 500 m of known colonies. In the case of the swift parrot, the goal posts expanded to incorporate wet forest containing *E. globulus* within the breeding range.

With a changing climate, the goal posts are shifting even more as species ranges change or species come under greater pressure, further reinforcing the importance of ensuring planning instruments and processes provide for adaptive management, including species-specific adaptation strategies (McCormack & McDonald 2014; Oliver et al. 2016; Robbins 2015).

> The big challenge now is with climate change and whether your current sites are adequate for the long-term. Species like *Eucalyptus morrisbyi* are going down quickly. There's been a massive mortality at the Calvert's Hill site which traditionally was the bigger of the two sites. So, from two thousand plants 20-years ago down to about 100-200, and only a few of those with seed on them as mature plants … not looking good (Int33 2015).

With the discovery of new sites, redefinition of species habitat or management requirements and changes to the lists of priority species, flexibility within statutory instruments is critical to enable this new knowledge to be taken into consideration without needing to amend the planning scheme (Knight & Cullen 2012).

> [T]he more information we get, the better our understanding of conservation requirements, and things change, … so there's got to be some flexibility or hopefully, there's some flexibility where you can revisit or change or strengthen or tighten as the need arises (Int10 2015).

> [T]hings do change and also sometimes … you just have to go there (Int13 2015).

The importance of providing some flexibility within statutory instruments also works both ways. Just as there may be new information that results in greater restrictions for some landholders, new knowledge can also decrease the level of protection required to conserve species.

> I think a roadside wallaby grass which … [is] EPBC listed … a Victorian taxonomist has come along and has claimed it's the same as Victorian species. And it's considered to be an introduction down here; so it's being delisted (Int33 2015).

However the static nature of planning schemes, combined with the lack of clear definitions and guidelines in the interim schemes and SPPs, are barriers to adaptive management and leave considerable room for interpretation.

6.3 The compromised consultant

It has been established in section 6.1 that desk-top data is unreliable at the site-specific scale and therefore field verification is critical to determining whether values are present and impacted upon. As established in section 6.2, the process of field verification in turn requires a degree of interpretation, particularly in relation to classifying vegetation communities, identifying habitat and incorporating new knowledge. However, there is a lack of endorsed guidelines, criteria and decision support tools specific to land use planning to support this interpretation. In addition, as established in section 3.2.3, there is no formal referral agency or advisory body to act as referee when there are differences in interpretation. Given that, in most instances, the person undertaking the field verification and subsequent assessment against the planning scheme provisions is a suitably qualified person engaged directly by the applicant, 'the issue then becomes how independently verifiable is what they are saying' (State Expert 1 2015).

Eleven percent of interviewees (n = 4) were of the opinion that the consultants they dealt with were not compromised or biased in their assessments.

> Personally I don't believe that [consultants are inherently biased towards those people that pay them]. It's not my experience, that that's the case. But it's a view held by some of the community (Manager Planning 5 2015).

Whereas 28% (n = 10) of interviewees across all areas of expertise, all scales and regions and State, local and non-government, including ecological consultants, expressed the view that consultants are compromised simply by virtue of being engaged by the applicant.

> The developer's engaged the consultant who then has an inherent conflict because they're paid by the developer aren't they? (Statutory Planner 1 2015).

> If you're an applicant employing a consultant you're almost trying to buy a permit from him and buy a report that's going to favour what you want to do (Manager Planning 3 2015).

> There's confusion out there for all the specialist people working for developers… the planning system expects that as a specialist we are impartial, but our client would like us to not be (Ecological Consultant 2 2015).

> I mean they're paying the bills so you certainly-you can subtly change how you say things and they certainly give pressure to do that (Ecological Consultant 1 2015).

> There's some pragmatic reasons why it's not always great to rely on the consultant working on behalf of a developer and their information and we have, I think it's fair to say, some fairly regular issues with consultants about their interpretation of values and how they think those values should be managed versus our expertise in that regard (State Expert 1 2015).

Two of these interviewees acknowledged that, despite being compromised, consultants were generally trying to get the best conservation outcomes whilst still meeting the needs of their clients, the developers.

> The only report we can really look at is usually the one that's provided by the applicant; and, surprise surprise there's nothing worth saving in this environment or it's curbed in a way that facilitates with what they want… there are certainly some significant people out there that do good work, but they still are badgered by their developer... If they don't give the developer what they are asking for they won't get the job next time… Working for Council they can come up with

> some recommendations that really do have biodiversity interests at heart, working for the developer, they're coming up with a solution that they can kind of tolerate and sleep with that still pushes the development through (Strategic Planner 1 2015).
>
> His commitment is to actually try and get as much before he gets the boot basically. And he appreciates that he can probably get more out of those developers than anyone else. In this work place they are doing their best to uphold as much as possible, but it's driven by the developer (NRM 3 2015).

As shown in section 6.1.3, many planning authorities are limited in their capacity to review or question the assessment of the suitably qualified person engaged by the developer. In addition there is no formal process or regulatory body to review and audit assessments undertaken by the suitably qualified person within statutory planning. In contrast, the FPS has certification and accreditation processes for Forest Practices Officers (FPOs), with a skills-based Forest Practices Board appointing and delegating FPOs (State Expert 6 2015).

6.3.1 Certification and accreditation

The introduction of certification and accreditation of suitably qualified persons, including auditing and oversight by an independent body, was identified as potentially worthwhile by 42% (n = 15) of interviewees across all areas of expertise.

> I do think there's an opportunity for some sort of accreditation or having a pool of registered experts whose material can be relied upon but I do think there always has to be the decision maker can disagree with that (NGO Expert 1 2015).
>
> We need to know that when someone does a survey for the orange bellied parrot they have undoubted expertise in that area... People that do flora and fauna assessments… virtually anyone with a science degree can go and do it (NGO Expert 3 2015).
>
> There needs to be an independent body there or an independence of assessment (Statutory Planner 1 2015).
>
> Absolutely [accreditation is worthwhile]. I also think there should be some auditing. I have seen many botanical flora and fauna reports where they're not of sufficient standard and they demonstrably missed many plants that they haven't identified, so what have they not reported on? (Ecological Consultant 2 2015).

However, one interviewee expressed concerns about the costs of introducing an accreditation system.

> It's very hard to have one accreditation that said, 'Yes you're qualified'. I think Council staff need to be savvy enough to think, 'Do I know that ecological consultant? Can I ask for their qualifications to make sure they are suitably qualified?' I think that caveat there,-suitably qualified,-gives Council the ability to ask questions if they need to or if that person isn't known or even if their data doesn't seem consistent… I think a place as small as Tasmania, it should be easy

> to ask those questions and find those things out. I think accreditation could be really expensive and therefore just not viable potentially (NRM 2 2015).

Establishing an accreditation process clearly requires resourcing as well as consideration of how it is established and maintained in a manner appropriate to land use planning. However, such processes have been established in relation to bushfire, Aboriginal heritage and forest practices. As acknowledged by a number of interviewees (*n* = 5, 14%), predominantly state experts (*n* = 4), the accreditation system established for forest practices in particular has potential as a model.

> Anybody can call themselves a Botanical consultant and get out there and get work… Personally I think there should be some accreditation process. I mean FPO's have to be accredited and I think they have to be reaccredited every few years. It's baffling to me why they don't have a similar system for people setting themselves up to be consultants. (State Expert 8 2015).

> I think they should have certification. I feel that passionate. How you do that I'm not quite sure, but FPA does it with their FPO's, their Forest Practices officers (State Expert 3 2015).

Accreditation, while only part of the solution to addressing the potential bias associated with the direct engagement of suitably qualified persons by the applicant, provides much needed accountability and support for ecological consultants.

6.3.2 Formal referral system

Another solution to reduce potential bias identified by a number of interviewees is the establishment of a referral system or process, akin to that for Level 2 activities or heritage.

> I'd prefer to see a [referral] mechanism similar to those which existing in EMPCA, cultural heritage and water and sewerage (Manager Planning 4 2015).

> If you did have an independent referral agency that was purely looking at the biodiversity outcomes, and if it was their assessment that irrespective of any of the economic or social benefits that Council had identified, from a biodiversity perspective it wasn't going to stack up then Council's hands were tied, then I think that's the appropriate way to do it and we do have that model with some of the other things like heritage and sewerage and water and Level 2's so it's not a foreign concept for the planning system to adopt that sort of referral process (NGO Expert 1 2015).

Some planning authorities do refer proposals to the Policy Conservation Advice Branch (PCAB) of DPIPWE for informal advice, especially where State listed communities or species may be impacted. However there is no legislative requirement for them to do so, there is no head of power for DPIPWE to provide binding advice and the level of advice received is variable and not always helpful.

> It's very random who refers things to PCAB from Councils. Obviously because there's no trigger in LUPAA to say you must or the planning scheme's say you must (State Expert 5 2015).

> We do [refer applications to PCAB], but often their advice is very difficult to make much out of, and the chances of them turning up to a panel hearing and actually advocating a position is slim, and sometimes, if the only advice is there maybe the presence of some particular species, and they … recommend that you do another assessment at a different time of the year; that's the end of the story. We've got no legs to really follow it up (Strategic Planner 1 2015).

> Referring to PCAB is great. PCAB go 'that bit's ok, that bit no way'. Then we can go 'that bit ok, that bit no way' (NRM 1 2015).

> Occasionally [we refer applications to PCAB]. But to be honest, pretty rarely, (i) because of the time, and (ii) because I've often found their responses not overly helpful or useful (Environmental Planner 2 2015).

> We ask for the developer to get the information from a private consultant. If there's a threatened species we don't send it through... If it needs a threatened species permit, we'll come to a conclusion ourselves on the basis of the qualified report we've got or we might get a second opinion from another consultant. We don't go to DPIPWE (Manager Planning 2 2015).

There is also a lack of referral requirements under the EPBCA, which is based on a self-referral system. Under the self-referral approach, planning authorities are not required to refer proposals to the Commonwealth where they may have a significant impact on a matter of national environmental significance and there is no mechanism for them to do so.

Establishment of formal referral processes integrating statutory planning with State and Commonwealth legislation, in addition to the development of supporting guidelines and decision support tools and an accreditation system, would bring the processes for identifying and assessing impacts on biodiversity into alignment with the processes adopted by the FPS. Decision support tools guide the initial identification and classification of values and site-specific management prescriptions are determined by the FPA in consultation with DPIPWE. Therefore, the final interpretation of habitat and an appropriate management response is determined by the regulator, not the suitably qualified person, in this case the Forest Practices Officer.

Establishment of a referral system is contested, with some viewing such an approach as too complicated for a statutory planning process.

> I don't like the concept of the referral process because I think that the planning scheme needs to be able to stand on its own. While Heritage Tas has been quite good to deal with over the years, or at least that's what we've found, not many government departments are, and I would be concerned that resource limitations down the track would cause complications and slow everything up (Statutory Planner 1 2015).

Notwithstanding, ensuring a referral system works efficiently is a matter of legislative reform and resources; neither of which are insurmountable barriers, providing there is the political will.

Development of supporting guidelines and decision support tools, introduction of an accreditation process and establishment of a referral system are all potential mechanisms for improving consistency in interpretation and reducing the potential bias in expert advice. However these mechanisms do not sever the direct connection between a consultant and the developer, and consequently the conflict of interest remains.

6.3.3 Direct engagement

One possible mechanism to remove the conflict and associated potential bias identified by two interviewees was the engagement of consultants by the regulator rather than the developer, but at the expense of the developer.

> The regulator could engage us and that makes sense… It makes sense for the private sector to pay for it if they're the ones doing the development, but I wonder whether it could be structured slightly differently… I'm not sure how you'd fund that, but you could work some way out where somebody has to put an application in and then it could be commensurate with the scale of development… That way, really complex ones would cost more than other ones that are straightforward. But there's a fund then to resource that, that's paid independently of any particular developer (Ecological Consultant 2 2015).

> There needs to be some sort of independent funding for it. So the consultant is just accredited under an independent process and paid out of an independent pool of money. So they're not beholden to the developer. That's hard to imagine but the easiest step is that we need a certification process for consultants (NGO Expert 3 2015).

A similar approach could be adopted if a matter proceeds to appeal and the expert witnesses are engaged directly by the Tribunal rather than by the appellant or respondent. The potential for an expert witness to have a conflict of interest where engaged by a party to the appeal is acknowledged in expert witness Practice Direction 12.

> Where the same person represents a party at a hearing and gives evidence as an expert, there is a clear conflict between the overriding duty to the Tribunal and the duty to the party (client). (Resource Management and Appeals Tribunal 2018a).

Direct engagement of expert witnesses by the regulator or arbiter would arguably reduce bias and enable experts to assist the regulator or arbiter more impartially on matters relevant to the expert area of expertise, which according to Resource Management and Appeals Tribunal (2018b), is their duty.

6.4 Conclusion

In this chapter I have established that the current processes and rules for determining whether relevant concepts of biodiversity are present and impacted are compromised. It is widely acknowledged that field verification is critical to identification of relevant concepts. However the provisions of the SPPs and 34% (n = 10) of interim schemes preclude field verification outside the statutory overlay. Consequently, there is a reliance on desk-top data, unreliable at the site-specific scale, to make decisions and the impacts on values outside mapped areas remain unregulated and beyond consideration.

Notwithstanding, even where field verification is provided for, determining when values are present on a site and impacted by a proposal requires interpretation in classifying vegetation and determination of the significance of vegetation as habitat. Clear definitions, guidelines and management prescriptions specific to land use planning, and which are able to evolve as scientific knowledge changes, have the potential to improve substantive biodiversity conservation outcomes (Farrier, Whelan & Brown 2002; Ives et al. 2010; Peterson et al. 2007; Slocombe 1993). While such documents are forms of weak law (Buxton et al. 2006), when linked to statutory planning instruments and third party validation they gain in strength. The link between the *Forest Practices Regulations*, the Forest Practices Code, agreed management procedures and decision support tools utilised by the Forest Practices System in Tasmania provides a potential model worth further investigation.

Where values are identified as being relevant and impacted, determining whether this impact is acceptable comes down to the planning scheme criteria, or rules. This is the focus of the next chapter, where I evaluate the criteria used under the interim schemes and SPPs to determine whether the impacts are acceptable and in what circumstances (Chapter 7).

Chapter 7 - Determining what stays and what goes: the assessment criteria

In Chapter 6, I established that determining which concepts of biodiversity are present and impacted is compromised by: (i) reliance on desk-top data; (ii) problems of classification and interpretation; (iii) a lack of agreed definitions and guidelines; and, (iv) a lack of accreditation or referral processes. Notwithstanding, where concepts are identified as being relevant and impacted, a proposal must be assessed in relation to the planning scheme standards, or rules, to determine whether the impact, and associated loss, are acceptable. The challenge of determining the standards that need to be incorporated into environmental legislation to establish when loss is, or is not, appropriate is at the heart of integrating biodiversity conservation into land use planning.

In this chapter I examine the standards used in the biodiversity-related codes in interim planning schemes and the priority vegetation provisions under the State Planning Provisions (SPPs) to assess impacts on biodiversity. Specifically, I investigate the circumstances in which loss is considered acceptable, the integration of the mitigation hierarchy and the importance of the substantive exercise of discretion in the decision-making process.[32]

7.1 Acceptable solutions, acceptable loss

Under the interim planning schemes and the SPPs, a development impacting on identified concepts of biodiversity must comply with each applicable standard. These standards set the tests to meet the stated objectives for biodiversity, through either an acceptable solution or performance criteria. The distinction between an acceptable solution and a performance criterion is that, if a proposal satisfies the acceptable solution, it must be approved, albeit subject to conditions. Whereas, where a proposal requires assessment against the performance criteria, the planning authority has the discretion to refuse the application.

All interim schemes have acceptable solutions, which, if satisfied, preclude further consideration of the impacts on biodiversity. The wording of the acceptable solutions differs between the regional groups (Table 7.1). Within the North West interim schemes (Group 3) and the Northern interim schemes (Group 1), there was an acceptable solution where the clearing and associated impacts have been assessed by another regulator. In the case of the Northern interim schemes, this regulator is the Forest Practices System (FPS) whereas in the North West interim schemes the regulator is not specified. In the Southern Interim schemes with biodiversity codes (Group 2) there are no equivalent acceptable solutions. Rather, authorisation by another regulator was an exemption where specified. This exemption results in a similar outcome to the acceptable solutions in Groups 1 and 3, but without

[32] This chapter draws on the results of the content analysis of planning schemes (section 2.1.3), the spatial data analysis (section 2.1.4), the semi-structured interviews (section 2.1.2) and the integrated analysis (section 2.1.5).

the need for any permit or an ability to impose conditions. Therefore, while there was a significant difference in the wording, all schemes include provisions intended to avoid duplication between regulators. However, the lack of integration between regulations and regulators creates loop-holes and confusion (section 3.2).

All schemes in Group 2 also have an acceptable solution where the impact is limited to a building area on a plan of subdivision approved under the scheme. The basis for this acceptable solution is that the impact was assessed and addressed at the subdivision stage so the subsequent development should be able to proceed on a permitted pathway (Table 7.1). The North West interim schemes (Group 3) and the Northern interim schemes (Group 1) also have an acceptable solution where the clearing does not impact on the named concepts (Table 7.1). In the case of Group 3 these named concepts are limited to threatened native vegetation communities, threatened species habitat, threatened species or watercourses and wetlands within specified zones (Chapter 4). In Group 1 (the North), the named concept was limited to priority habitat as identified in the statutory map (Chapter 4). In the Southern interim schemes with biodiversity-related codes (Group 2) a similar concept was applied in 80% of schemes. However in these schemes a maximum impact threshold was also established, such as clearance of 5000 m^2 of low priority biodiversity values in specified zones (Table 7.1). Thresholds in acceptable solutions are an appealing concept, as they provide a permitted pathway for small-scale, low-risk impacts.

The acceptable solutions for development under the SPPs are consistent with those adopted by the Southern interim planning schemes with biodiversity-type codes (Group 2), where the impact is limited to a building area on a plan of subdivision approved under the scheme. The acceptable solutions therefore establish when a loss is considered to be acceptable, which include: where a regulator has issued a permit (irrespective of the scope of the permit); the impacts are limited to specified concepts; any specified thresholds are not exceeded; and, the site is subject to the code in the first instance. Where these acceptable solutions cannot be satisfied, or there are no acceptable solutions available, the performance criteria must be met. However where the acceptable solutions are satisfied, the clearing *must* be approved, albeit subject to conditions. There is no ability to consider the significance of the impacts or whether the impacts could have been reduced or avoided, or minimised. The loss is conditionally acceptable. Furthermore, exempting urban-type zones from code application and limiting code application to a statutory map further excludes areas important for biodiversity, irrespective of their priority or significance (sections 5.2.1 and 6.1.4). In these circumstances not only is loss acceptable, but loss is unconditionally acceptable.

To address these deficiencies in the acceptable solutions, 86% (n = 6) of schemes in Group 1 (Northern interim planning schemes) include an additional provision (Clause 8.3.1 A2) which provides a broad safety net for native vegetation generally (sections 5.2.2 and 6.1.4). As this provision was applied textually and was subject to few exemptions or exclusions, clearance of almost any native vegetation within the local government areas (LGAs) containing these provisions technically requires assessment under the performance criteria unless the clearing is authorised under a certified forest practices plan.

> The way that the provisions were written was such that those Councils that had some in-house expertise, so NRM officers, for unmapped vegetation, so … not mapped as priority habitat, we can make an in-house call. But yes it is discretionary. We can't make a judgement based exemption ... When you go to judgement based exemptions, then … there are thumping great loopholes you can drive a truck through (Manager Planning 2 2015).

In addition, two (20%) Southern interim planning schemes with biodiversity-type codes (Group 2) did not include the acceptable clearing thresholds for low priority values (Kingborough and Glenorchy Interim Planning Schemes). In addition, while all schemes within this group were subject to statutory maps and had no textual application for the code, these two schemes also apply the statutory map broadly across the landscape, capturing > = 98% of mapped native vegetation. With the exception of more generous exemptions, as with all schemes in Group 1 (excluding Launceston), clearance of almost any native vegetation within these two interim schemes technically required assessment under the performance criteria. Therefore, for 29% (*n* = 8) of interim schemes, there was generally no permitted pathway for clearing native vegetation broadly and clearing requires assessment against the performance criteria (Table 7.1). Whereas, for the majority of planning schemes (*n* = 21, 71%), assessment against the performance criteria was limited to a subset of native vegetation or vegetation within the statutory overlay and where the clearing was in excess of acceptable thresholds.

While the SPPs will reduce the number of acceptable solutions and therefore increase the extent of consideration of impacts against the performance criteria in some planning schemes areas, application of the priority vegetation provisions will be limited to a subset of native vegetation within the statutory overlay and only within specified zones for *all* planning schemes. Therefore, for 29% (*n* = 8) of planning scheme areas, introduction of the SPPs will reduce the extent of native vegetation subject to assessment under the performance criteria and represents a step backwards in the integration of biodiversity conservation into statutory planning.

7.2 The mitigation hierarchy

Irrespective of whether satisfying the performance criteria is a procedural or substantive requirement, the performance criteria within biodiversity-related codes currently in effect can be categorised into the different stages of the mitigation hierarchy (Table 7.1). The mitigation hierarchy establishes a stepped process, or hierarchy, whereby 'developers should first seek to avoid, minimise and mitigate the harm their projects cause to biodiversity… Only then should they offset the residual, unavoidable impact of the project on biodiversity' (Christensen 2007:14).

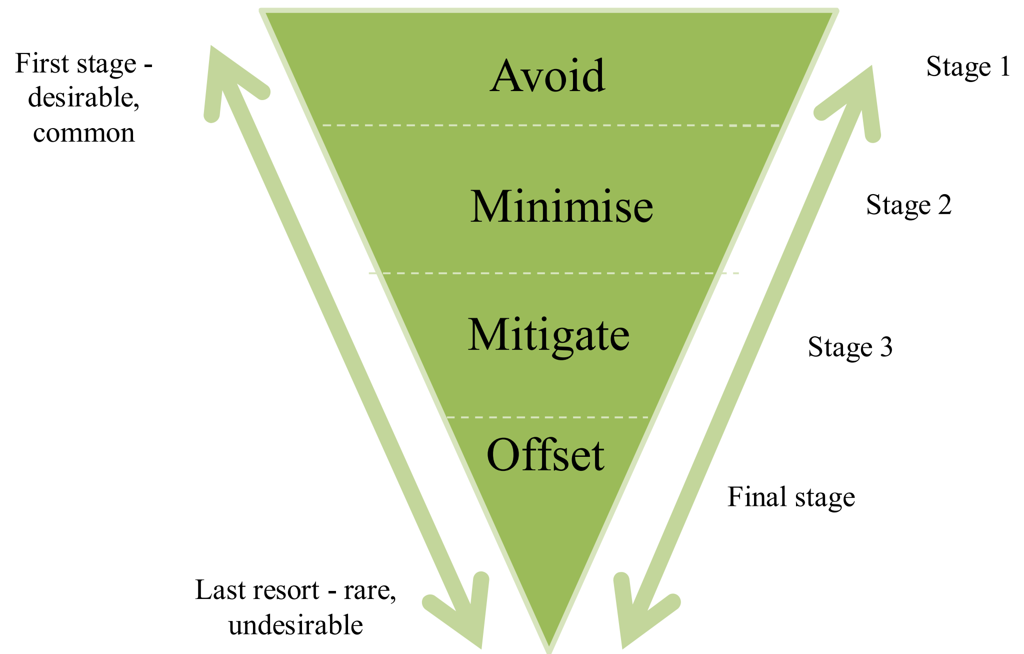


Figure 7.1 The mitigation hierarchy

7.2.1 Avoid

The first stage in the mitigation hierarchy is to avoid the impacts in the first instance. Avoidance of impacts on biodiversity may be achieved by investigating alternative solutions, including alternative locations or routes or different scales or designs of development to avoid biodiversity impacts (Preston 2016). The key criteria pertaining to avoiding impacts in interim planning schemes include whether the extent and significance of the impacts are acceptable, whether the nature of the proposal is special enough to be allowed to proceed and whether the concepts being impacted are irreplaceable (Table 7.1). These criteria are in essence the first order tests for whether a proposal should be able to proceed as proposed.

> There are situations where the value is so significant it should not be impacted upon, even if this means a development cannot proceed, especially when those values are able to be located/identified (NGO Expert 2 2015).

However in many cases, avoiding impacts does not necessarily mean refusing an application, it can be a question of design, such as, relocating on the site or changing the construction standard to reduce the need for bushfire hazard management.

> The local biodiversity value overrode the first push of what he wanted to do... didn't prohibit him whatsoever; it just meant he had to rethink how he did it… yes it's going to be a bit more complicated and a bit more expensive than the el cheapo off the shelf timber cabin, but they could coexist (Manager Planning 2 2015).

Notwithstanding, the development approval process is not a negotiated process but rather a statutory one. As such, the planning authority is obliged to assess the development as submitted against the criteria in the scheme. Therefore, if an applicant is not willing to consider design changes which would avoid impacts, the option is there for the applicant to make their case in relation to the performance criteria. These performance criteria establish when loss is, or is not, acceptable. The performance criteria incorporated into interim planning schemes are adaptations of tests for acceptable loss under s19 (1AA) of the *Forest Practices Act 1985*. Each of these performance criteria are discussed in turn below.

(Un)acceptable loss – the extent, significance and acceptability of impacts

All schemes except those in Group 4 included performance criteria pertaining to the extent and significance of impacts, which are tests for when avoidance is required. While the specific criteria varied from Group to Group (Table 7.1), implicit in these criteria was the notion of an acceptable level of impact. As established in section 6.1.5, impacts are species and site specific and scale and context dependent. The loss of a handful of trees on one site may have a significant impact on particular species, whereas the loss of the same number and species of trees at a different site may only have minor impacts on different species. Accordingly, acceptable thresholds of loss varied. Similarly, a small and highly-disturbed patch of remnant vegetation may be of limited significance in some contexts, but in other contexts can be critical, 'with some species only found in remnants of poor integrity' (Kirkpatrick & Gilfedder 1995:644). With a considerable focus in land use planning on condition, there was a tendency to justify the loss of remnant vegetation on the basis of poor condition, often ignoring the potential significance of this vegetation for conservation.

> There's so much based on condition that a developer will actually argue very strongly 'the condition is poor hence we can do this'. The condition of an area of significant vegetation is not really that relevant as long as it hasn't gone so far down that it can't be regenerated to a fairly good quality condition (NRM 3 2015).

Furthermore, even where the individual impacts of a discrete proposal may be insignificant on their own, the cumulative impacts from multiple developments can potentially degrade critical resources over time (Dales 2011).

However neither current schemes nor the SPPs included performance criteria which established explicit thresholds or defined what level of impact is acceptable for each of the concepts mentioned; no interim schemes provided for the consideration of cumulative impacts; and, no interim schemes identified patches of vegetation or sites where loss was unacceptable and clearing was not an option. Consequently, the acceptability of an impact was predominantly determined by reference to the other performance criteria.

(Un)exceptional circumstances

> In the first step of the sequence (avoidance), it is important to note that impacts to unique and rare habitats, special aquatic sites, and other critical environmental assets are generally prohibited; they must be avoided unless it is an exceptional case (McKenney & Kiesecker 2010:167).

A test used by a number of regulators to determine whether loss is acceptable is that of exceptional circumstances (Department of Natural Resources and Environment (Vic) 2002; Department of Sustainability and Environment (Vic) 2007; Forest Practices Authority 2008; 2010). All interim planning schemes in Group 3 (the North West interim planning schemes) incorporated the definition of exceptional circumstances as that applied under the FPS (Table 7.1). Under s3(1) of the *Forest Practices Act 1985*, exceptional circumstances include the need to do one or more of the following:

(a) ensure the physical safety of an owner of land or the owner's relatives or employees;

(b) remove or reduce a bushfire risk;

(c) respond to a threat to the State's biosecurity;

(d) protect a rare, vulnerable or endangered species of flora or fauna;

(e) discharge a statutory obligation or comply with an order of a court.

These circumstances are indeed exceptional and unlikely to relate to a proposal being assessed under a statutory planning scheme. Therefore this test is not particularly useful within the context of a planning scheme. On this basis, those Southern interim planning schemes with biodiversity-type codes (Group 2) adopted the test of special circumstances as the test to justify impacts of a proposal upon high priority biodiversity values such as threatened native vegetation communities or significant habitat for threatened species (Table 7.1). The test of special circumstances adopted in Group 2 was derived from the former Victorian Native Vegetation Framework (Department of Natural Resources and Environment (Vic) 2002; Department of Sustainability and Environment (Vic) 2007). Under these schemes, special circumstances are considered to exist if one or more of the following apply:

(a) the use or development will result in significant long term social or economic community benefits and there is no feasible alternative location;

(b) ongoing management cannot ensure the survival of the high priority biodiversity values on the site and there is little potential for recruitment or for long term persistence;

(c) the extent of proposed removal of high priority biodiversity values on the site is insignificant relative to the extent of that community elsewhere in the vicinity; and,

(d) the development is located on an existing title within the Inner Residential, General Residential, Low Density Residential, Rural Living or Environmental Living Zone and is for a single dwelling and/or associated outbuilding (Kingborough only).

The test of exceptional or special circumstances has merit. However, each of these tests is open to broad interpretation. Consistent with determining values, there are no supporting guidelines or processes to inform interpretation of each these tests. In the absence of more explicit guidelines, almost all developments can potentially be interpreted as complying with one of the tests. Consequently, special circumstances are not necessarily special and therefore the concept as currently adopted in the Southern interim planning schemes does not provide a robust test for when a loss is not justifiable.

There is no specific reference to special circumstances in the SPPs. However Clause C7.6.2 P1.1 includes a similar test requiring that clearance of native vegetation within a priority vegetation area must be for:

(a) an existing use on the site, provided any clearance is contained within the minimum area necessary to be cleared to provide adequate bushfire protection, as recommended by the Tasmanian Fire Service or an accredited person;

(b) buildings and works associated with the construction of a single dwelling or an associated outbuilding;

(c) subdivision in the General Residential Zone or Low Density Residential Zone;

(d) use or development that will result in significant long term social and economic benefits and there is no feasible alternative location or design;

(e) clearance of native vegetation where it is demonstrated that on-going pre-existing management cannot ensure the survival of the priority vegetation and there is little potential for long-term persistence; or

(f) the clearance of native vegetation that is of limited scale relative to the extent of priority vegetation on the site.

These criteria are even broader than exceptional or special circumstances under interim schemes, and consequently almost any loss is potentially able to be justified.

(Ir)replaceable values

Recently, the concept of irreplaceability has gained traction as an important criterion for determining when biodiversity loss is not acceptable and offsets are inappropriate (Bekessy et al. 2010; Brownlie, King & Treweek 2012; Business and Biodiversity Offset Program 2012a, 2012b, 2012c; Gardner et al. 2013; Kiesecker, Copeland, Pocewicz & McKenney 2009; McKenney & Kiesecker 2010; Pilgrim et al. 2013). According to Pressey, Johnson and Wilson (1994:243), irreplaceability can be defined in one of two ways:

(i) the potential contribution of any site to a reservation goal; and,

(ii) the extent to which the options for a representative reserve system are lost if that site is lost.

While there are no direct references to irreplaceability within the SPPs, all North West interim planning schemes (Group 3), all Northern interim planning schemes (Group 1) and two Southern interim schemes (Group 2) incorporate criteria which require the impact of a proposal does not compromise the adequacy of representation of species or vegetation communities or compromise the comprehensive, adequate and representative reserve system (Table 7.1). In other words does not impact on an irreplaceable value.

As with exceptional circumstances, the concept of irreplaceability as defined in interim schemes was derived from the *Forest Practices Regulations*. Section 1AA of the Regulations specify that the Forest Practices Authority (FPA) is not to certify a forest practices plan involving the clearance and conversion of a threatened native vegetation community unless the FPA is satisfied the clearance and conversion is unlikely to detract substantially from the conservation of the threatened native vegetation community or conservation values in the vicinity of the threatened native vegetation community.

Irreplaceability is an important test as it provides a basis for determining the acceptability of a proposal entirely on the basis of the ecological impact. There are no direct or indirect irreplaceability tests in the SPPs and therefore there is limited ability to refuse an application based on the unacceptability of the impact. This is a major deficiency in the SPPs.

7.2.2 Minimise

The second stage of the mitigation hierarchy is to minimise impacts, 'where 'minimise' means to design a proposal in such a way as to reduce or lessen loss (ten Kate, Bishop & Bayon 2004). This requirement is well accepted and the intent easily understood, with all interim planning schemes including performance criteria requiring proposals minimise loss, clearance or impacts on specified values (Table 7.1). The Southern interim planning schemes with biodiversity-type codes (Group 2) also included a performance standard clarifying which types of development activities must minimise impacts, including bushfire hazard management, buildings and works and subdivision (Table 7.1). The expectation being that specified developments must be located in the site of least impact relative to potential alternatives (McKenney & Kiesecker 2010), taking into consideration constraints such as topography, hazards and the particular requirements of the development.

Under Clause C7.7.2 P1.2, the SPPs also include a requirement to minimise adverse impacts by specifying a number of matters to which a proposal must have regard, including the siting of the development, minimising impacts from bushfire hazard management, mitigation measures, offsets and cleared areas. These matters are broadly consistent with the criteria in the Southern interim planning schemes with biodiversity-related codes (Group 2). However the SPPs are drafted to only require the decision-maker to have regard to these matters in the exercise of the power or function, not to require them to exercise the relevant power or function so as to achieve results (Preston 2013). Therefore, while the SPPs include a clear procedural requirement to minimise impacts on biodiversity, they do not include a substantive requirement to do so.

7.2.3 Mitigate

According to ten Kate, Bishop and Bayon (2004), to ‘mitigate’ means to alleviate residual harm to the extent possible. In contrast to the minimise stage of the mitigation hierarchy, there was a significant difference between schemes in relation to mitigation of impacts, with only Groups 2 and 4 (Southern interim schemes) explicitly including criteria requiring implementation of mitigation measures (Table 7.1). This variation may reflect the varying interpretations of the mitigation hierarchy, with some identifying it as a three stage process of avoid, minimise and offset (Calvet, Napoléone & Salles 2015; Kiesecker, Copeland, Pocewicz, Nibbelink, et al. 2009; McKenney & Kiesecker 2010; Quétier & Lavorel 2011; Southern Tasmanian Councils Authority 2013). The assumption appears to be that if steps are taken to minimise and offset impacts, then, by definition, impacts are mitigated. Others include a fourth stage by identifying the hierarchy as avoid, minimise, mitigate then offset (Business and Biodiversity Offset Program 2012b; Christensen 2007; Natural and Cultural Heritage Division 2015b; Preston 2016; Southern Tasmanian Councils Authority 2013). Under the four-stage mitigation hierarchy, to mitigate is to do more than minimise but is not going so far as to offset.

7.2.4 Offset

Biodiversity offsets are conservation actions intended to compensate for the residual, adverse impacts on biodiversity, so as to ensure no net loss of biodiversity (Christensen 2007). As the last stage in the mitigation hierarchy, offsets should only be used when alternatives and options to avoid those impacts have been exhausted and it is still considered desirable, for other economic, social or environmental reasons, for the proposal to proceed (Southern Tasmanian Councils Authority 2013).

Biodiversity offsets are less established in Tasmania than in other Australian states, where offsets are part of an integrated statewide approach supported by regulation and associated guidelines (Department of Environment Land Water and Planning (Vic) 2015; Southern Tasmanian Councils Authority 2013; State of New South Wales 2007, 2008b). In Tasmania, biodiversity offsets are primarily utilised by statewide bodies, such as the FPA, the Environment Protection Authority (EPA) and the Assessment Committee for Dam Construction (ACDC), each of which have guideline documents assisting in the application and formulation of offset packages (Department of Primary Industries Parks Water and Environment 2016b; Forest Practices Authority 2017; Natural and Cultural Heritage Division 2015a).

In response to the changes to the *Forest Practices Regulations* and subsequent increase in the responsibility of local planning authorities in regulating the removal of native vegetation, Kingborough Council introduced a Biodiversity Offset Policy. The introduction of a local government driven offset policy was seen by some as inappropriate as offsets were seen as being within the jurisdiction of the State Government.

> Offsets are really interesting. There was a bit of, I think, funniness when Kingborough put in an offset policy… 'Council are overstepping the mark, and that's our deal'. And I just think, well there's absolutely no willingness from the State Government level to enforce offsets (State Expert 5 2015).

Decisions of the Resource Planning and Appeals Tribunal (*AAD Nominees Pty Ltd v. Kingborough Council* [2011] TASRMPAT 6 and *H and A van Beelan v Kingborough Council* [2010] TASRMPAT 245) created uncertainty about the ability of planning authorities to require offsets without incorporating explicit offset provisions within the relevant scheme. Consequently, Kingborough Council amended Schedule 10 of the Kingborough Planning Scheme 2000 to provide an explicit head of power for offsets. In the absence of an integrated statewide approach to offsets and with other planning authorities occasionally requiring offsets, Kingborough Council also instigated and funded the Southern Regional Offset Guidelines Project. This project, delivered by the Southern Tasmanian Regional Councils Authority, under the oversight of a steering committee comprising all Southern LGAs, resulted in the development of guidelines for applying biodiversity offsets at the local government level (Southern Tasmanian Councils Authority 2013). These guidelines were formally endorsed by 9 (75%) of Southern Councils.

Despite the introduction of regional offset guidelines (Southern Tasmanian Councils Authority 2013), until the introduction of the interim planning schemes, the Kingborough Planning Scheme 2000 remained the only scheme to provide an explicit head of power for offsetting and Kingborough the only planning authority to routinely require offsets. Notwithstanding, the survey results indicate at least a further 6 LGAs occasionally required offsets under pre-interim schemes, despite not having a specific head of power, with 71% (n = 4) from Group 2, one was from the North (Group 1) and one from the North West (Group 3).

> Not very many local governments pursue offsets really as an option. Some do but maybe they all do, but we certainly don't know about them. We've never been asked by more than 4 or 5 Councils, so Glamorgan Spring Bay, Break O Day, Sorell, Kingborough and Huon Valley are the 5 I can think off at the top of my head that I know we've consulted with in relation to offsets… But by and large we've had very little contact from local governments about offsetting and what to do or what advice we might provide or we think (State Expert 1 2015).
>
> There's a view that offsets can be quite difficult to achieve well because people don't understand them (State Expert 7 2015).

Inclusion of offsets under interim planning schemes

Inclusion of offset provisions have increased under interim schemes, with 100% of Northern interim schemes (Group 1) and 70% (n = 7) of Southern interim schemes with biodiversity-type codes (Group 2) including a head of power for offsets (Table 7.1). However no schemes in Groups 3 (the North

West and Flinders Island) or Group 4 (Southern interim schemes without a biodiversity-type code) provided a head of power for offsets.

> It's quite interesting seeing the interim schemes and which of them just don't tackle offsetting at all and whether that's a conscious decision that they won't offset or whether it's been put in the too hard basket (NGO Expert 1 2015).

Interim planning schemes in Group 1 (North) reference the General Offset Principles contained within the *Guidelines for Natural Values Surveys* (Natural and Cultural Heritage Division 2015a), whereas interim planning schemes with a head of power for offsets in Group 2 reference the Southern Regional Offset Guidelines (Southern Tasmanian Councils Authority 2013). These schemes also reference any relevant Council policy, with the exception of the Kingborough Interim Planning Scheme 2015, which references the specific policy (Biodiversity Offset Policy 6.10). Therefore, just as State regulations incorporate different offset guidelines and policy documents, so too do statutory planning schemes (Table 7.2).

Irrespective of the different guidelines or policy documents incorporated into planning schemes and other regulations, there are commonalities across State regulations and interim schemes in terms of offset requirements (Table 7.2). These commonalities include the ability to have on-site or off-site offsets, reservation, inclusion of restoration and revegetation actions and the ability for indirect offsets in the form of research and improving knowledge (Table 7.2).

There are also, however, key differences between State regulations and planning schemes in mode of application. While all regulations provided for reservation or protection of offset areas, the forms of protection or reservation varied with State regulations requiring private conservation covenants under the *Nature Conservation Act 2002* (NCA) or transferral to the Crown, whereas planning schemes provide for transferral to Council as public open space or protection via a Part 5 Agreement (Table 7.1). Part 5 Agreements are a legal instrument established under s71 of the *Land Use Planning and Approvals Act 1993* (LUPAA). Part 5 Agreements may be established in order to prohibit, restrict or regulate use or development or establish conditions subject to which a use or development may be undertaken (s72(2)(a) of LUPAA). They may also provide for any matters that achieve or advance the objectives of the resource management and planning system in Tasmania, any State Policy or the objectives of the applicable planning scheme (s72(2)(c) of LUPAA). Where Part 5 Agreements are established to maintain and protect biodiversity values in perpetuity within a specified conservation zone by being registered on the title, they are considered to be generally similar in intent and status to a conservation covenant established under the NCA.

While conservation covenants are generally considered to be the most secure mechanism for protecting an offset in a new reserve, conservation covenants are rarely supported where the area being protected is less than 10 hectares in size (Southern Tasmanian Councils Authority 2013).

Irrespective of the merit of an offset site for protection under a conservation covenant, a planning authority cannot require a conservation covenant as a condition of a planning permit as they are administered by the State Government (Southern Tasmanian Councils Authority 2013). Part 5 Agreements are therefore currently the only legal mechanism available to local government to establish conservation areas on private land as a condition of a planning permit.

There was also variation between regulations in the ability to require financial offsets. Unlike New South Wales, Queensland and Victoria, which all have State-based bio-banking or financial offset funds, there is no coordinated bio-banking or offset fund in Tasmania. Furthermore, only the FPA Offset Policy, the Southern Regional Offset Guidelines and Kingborough's Biodiversity Offset Policy recognise financial contributions as an offset option (Table 7.2). Moreover, only one regulator has financial contributions as an available offset option (Kingborough Council 2016a). The limited adoption of financial contributions and particularly the lack of a State-based biobanking scheme, reflects the concerns around the legal mechanisms establishing a biobanking system, the cost of managing it and the conservation outcomes that could be achieved.

> The legal mechanism by which to require an indirect offset in the form of a financial contribution, that's a challenge legally… we would have to create an instrument for that to be legal. I don't think we have the capacity to require an indirect offset of that kind ourselves… The other issue is … whether the costs of actually establishing and maintaining an offset fund would be greater than the actual resourcing we get from it and our conclusion at the State level at least for those projects that are assessed at the State level, is no there aren't enough of them and the amount we would have to charge would be inequitable to make it work (State Expert 1 2015).

> Paying a financial offset is just a really easy way out (State Expert 2 2015).

The level of flexibility within these guideline and policy documents also varies (Table 7.2). The guidelines developed for the use of offsets in the Resource Management and Planning System (RMPS), applied to Level 2 activities and adopted by the Northern interim planning schemes (Group 1), provide a high level of flexibility, with offset requirements determined on a case-by-case basis in accordance with broad offset principles (Natural and Cultural Heritage Division 2015a). A level of flexibility in determining offset requirements is important as absolute standards have the potential to result in perverse outcomes.

> There has to be some flexibility because obviously it's all about outcomes and people need to have confidence in any offsetting system both in terms of the confidence that it's actually delivering some genuine offset for values that are lost (NGO Expert 1 2015).

> We have had situations where offsets have been created for some species or for particular situations which really have been … too like for like, and not flexible enough. Non-vascular plants are a good example where we may end up and have ended up with a covenant of a very small area with some rocks in it because it supports particular lichen. And that's not a landscape

> approach. It's not a good outcome because someone's going to have or is having to report on it and monitor it all the time at huge expense because it's so small and still vulnerable but it's a like for like (State Expert 1 2015).
>
> One of the common things of an offset has always been the protection of land of equivalent value and depending on what it is that's triggered the offset it may or may not be that useful … if you've triggered an offset for a threatened species in many of the situations I'm thinking of, the loss of habitat isn't actually the thing that's driving the impacts to these species, and you do need that flexibility to look at other options or other things that are a reasonable offset (State Expert 4 2015).

While a level of flexibility is important to ensure conservation outcomes are meaningful, too much flexibility creates uncertainty, both for developers and for conservation outcomes.

> It's so vague it doesn't even sort of say, 'No net loss, one in two' it hasn't got that sort of detail (State Expert 5 2015).
>
> It could be good to have flexibility when dealing with such different things, diverse things. But then there's also a risk if they're not in the planning scheme that they'll just get pushed and pushed and diluted by developers and diluted by management and Council. I think it's always good to have really clear messages. Really clear and definite messages in terms of development and expectation, because then it's obvious to the developer how much it's going to cost and what the expectation is. So, yeah I haven't got enough experience with it. With working with them, with ratios when they are in the planning scheme to know that my gut feeling is it probably is good to have them there, but also to have the guideline document that's referred to that can be used (NRM 2 2015).

In acknowledgement of the limitations of the RMPS Offset Guidelines, the FPA Offset Policy, Southern Regional Offset Guidelines and Kingborough Offset Policy all specify offset ratios and equivalence requirements (Table 7.2) (Department of Primary Industries Parks Water and Environment 2016b; Forest Practices Authority 2017; Kingborough Council 2016a).

Offsets under the SPPs

When the SPPs come into effect, all planning schemes will provide for offsets, suggesting further acceptance of offsets as an important component in the mitigation hierarchy. In contrast to State regulations and interim planning schemes with offset provisions, offsets under the SPPs will be limited to 'having regard to' any on-site biodiversity offsets (Tasmanian Government 2018). No provision is made for ex-situ offsets or indirect offsets and no criteria are provided on what constitutes a suitable offset. The implication here is not that a proposal will not be able to proceed where a suitable on-site offset is not available. Rather, the implication is that where an on-site offset is not available or not supported by the applicant, the proposal may proceed without any requirement to offset impacts at all, as long as regard was given to 'any on-site biodiversity offset'. Therefore, while all planning schemes will include offset provisions under the SPPs, the extent to which these provisions will result in conservation outcomes is compromised.

To offset or not to offset

There are a number of potential explanations for the limited application of offsets via statutory planning schemes and the reduction in provision for offsets under the SPPs. One of the key barriers to incorporation of offset requirements into planning schemes is the limitations of LUPAA. As the statutory functions of Councils in their role as a planning authority are conferred by LUPAA, in assessing applications for use or development, planning authorities are limited in their powers by this Act (Southern Tasmanian Councils Authority 2013).

> The offset stuff in theory I think is fine, but it’s just too constrained by the regulatory problems (Consultant Planner 1 2015).

One of the ‘regulatory problems’ is that the jurisdiction of a planning authority is limited to the planning scheme area. The implication is that a planning authority has no ability to require any actions to be undertaken outside its planning scheme area (Southern Tasmanian Councils Authority 2013). Consequently, there appears to be no means under LUPAA for a planning authority to accept or consider in its determination of an application a proposed offset that is beyond its planning area.

> I think that's part of the difficulty now is the ability to require an offset but it has to be found within the municipal area rather than the bioregion (NGO Expert 1 2015).

> With any sort of offsets, the best offset might not be in the same area, they could be in a totally different area (State Expert 5 2015).

> If you’re looking at a particular patch of vegetation, a suitable offset… could well come from a different parcel of land or different municipality. It’s simply impossible for our planning scheme to regulate another application across municipal boundaries…We might have a suitable offset just over the border in Brighton for instance and as far as the natural assets go, that would be a perfect offset, but we just can’t simply coordinate ourselves through our planning system with our schemes (Strategic Planner 1 2015).

However, this limitation has not been tested and at least two development applications involving offsets in another LGA have been approved. One application was the Kingston Bypass and while the loss was in Kingborough, a significant portion of the offset was the protection of a site in Glamorgan-Spring Bay. As this development application went to Appeal, the requirement for an off-site offset was therefore imposed by the Tribunal under the Tribunal amended permit. The other instance was also a road upgrade in Sorell involving an offset in Tasman.

> We drag Tasman in because they have an area suitable, the only equivalent area for one, and this is for statutory offset process (State Expert 1 2015).

In both instances, other regulators were involved in the approval and offset negotiation process. In the case of the Kingston Bypass both the FPA under the *Forest Practices Regulations* and the Commonwealth Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) were involved. In the case of the offset in Tasman, the Department of Primary Industries, Parks, Water and Environment (DPIPWE) was involved under the *Threatened Species Protection Act 1995* (TSPA). Irrespective of whether LUPAA currently enables offsets outside the LGA within which the loss occurred, an integrated State-based approach to offsets, potentially requiring legislative reform, could provide for such options.

> If there was a Statewide scheme there would be that opportunity to allow for offsets outside municipal areas (NGO Expert 1 2015).

> So that's a really good opportunity for a regional body or the State to intervene. And I think the State really ought to step-up into the space, and identify those kinds of species, those types of environments that they want to enhance, and provide that guidance and that's probably lacking at the moment (Strategic Planner 1 2015).

To date there has been limited leadership from the State in offsetting and no progress towards an integrated approach to offsets. The merit of a State-based approach has been dismissed partly on the basis of the limited need and therefore limited benefit relative to cost.

> When we looked at the potential for offsets in Tasmania, one of the things we found was that the number of occasions where offsets are actually used is quite small. And therefore, there's very little justification, it's very difficult to make a business case to say we should be spending money on developing an offset system because the cost in developing it will far exceed any benefit we're likely to get in anytime soon. Because there aren't that many offsets (State Expert 1 2015).

However the investigation into the merits of a State-based offset system didn't include or consider the need for offsets at the scale of local government and statutory planning.

> It didn't look at local government and that's also partly because not very many local governments pursue offsets really as an option. Some do but maybe they all do but we certainly don't know about them (State Expert 1 2015).

The limited use of offsets was therefore taken as synonymous with the limited need for offsets, creating a self-fulfilling prophecy whereby the lack of a Statewide approach constrains offsets at the local scale, which perpetuates the view that there is a limited need for offsets.

> If we had a-you know if a system was set up that would cover the whole State, maybe took financial offsets rather than just land, it would be I think far more practical and far easier to require offsets… much more likely to use them (Environmental Planner 2 2015).

In addition to limitations with LUPAA and the lack of a State-based approach to offsets, another explanation for the limited application of offsets via statutory planning schemes and the reduction in provision for offsets under the SPPs is the difficulty in creating meaningful offsets for relatively small losses.

> You've got small loss, small offset. And what needs to be built in … was to be able to take a more landscape, cumulative approach and say well we may have 50 developers and they're all doing small things but we have to have a consolidated response and a consolidated offset outcome that deliver some kind of conservation benefit rather than this sort of little piece meal (State Expert 1 2015).

One of the simplest ways to have a consolidated response that enables little impacts to result in a big conservation outcome is to provide a mechanism for financial offsets. This is the approach taken by Kingborough Council, who only allow financial offsets where the loss is small relative to the biodiversity value being impacted, there is no meaningful opportunity for on-site offsets and a more strategic outcome can be achieved by pooling resources (Kingborough Council 2016a). The approach taken by other regulators is to not offset small losses at all.

> In reality there is so much biodiversity loss that's going on that doesn't require approval, or activities that don't require approval, so there is this net decline, then we need to seek every opportunity to formalise long-term conservation of land and offsets does that (Ecological Consultant 2 2015).

As established above, in the absence of a State-based offset system and with planning authorities not able to require conservation covenants, the primary mechanism available to secure an offset outcome via the development approval process is a Part 5 Agreement. However the view that Part 5 Agreements are an ineffective or undesirable mechanism for achieving conservation outcomes may also contribute to the limited application of offsets via statutory planning schemes. A quarter of interviewees (n = 9) from across all areas of expertise acknowledged that Part 5 Agreements are considered to be ineffective or undesirable, particularly as a result of enforcement and resourcing issues.

> I think [Part 5 Agreements] are probably not used as much as they could and should be and I don't know whether that's because Councils don't understand them, because Councils don't want to take on the monitoring and enforcement burden of those things, or whether they are actually more difficult to implement than I imagine that they are. But I do like them as a mechanism for protection (NGO Expert 1 2015).

> Obviously the Part 5 Agreements, they're not always effective are they, the Part 5 Agreements? (State Expert 3 2015).

> There's a perception from a State government perspective, that Part 5's are pretty weak. You know, that they don't carry really much legal weight (State Expert 1 2015).

> We won't use Part 5 Agreements unless we have no choice because they have many operational problems (Statutory Planner 1 2015).

> We don't like Part 5's … my understanding is we don't want the responsibility because as far as I understand, we've actually offloaded as much land as we possibly can. It's seen as a liability and a cost impost (NRM 4 2015).
>
> We try to avoid them if we can, they are a layer of complexity for many permits and titles and whatever (Manager Planning 3 2015).
>
> We've got Part 5 Agreements but they do not work. Because we don't enforce them (NRM 5 2015).
>
> I can understand local government managers going, 'We don't want too many Part 5's', and I know this happens in a Council not so far from here, where they're saying 'no Part 5, no Part 5, we can't, we can't follow up, there's no point, they take too much effort from our end to actually create and then we've got to supposedly monitor them. No too hard don't do it. We'd rather some other cut and dried mechanism without a long term commitment from us, rather than the Part 5' (State Expert 1 2015).
>
> You hear of many cases where there are Part 5's that aren't being met but Council doesn't feel in a position to be able to take them on. So, in that sense, they obviously have a weakness (Ecological Consultant 2 2015).

However, 17% (n = 6) interviewees highlighted the importance of Part 5 Agreements as an important mechanism for achieving biodiversity conservation outcomes.

> Part 5 Agreements … serve all those same purposes as covenants in the sense of being on the title and being a restriction but they're also permit conditions, so to some extent that opens it up to civil enforcement and public oversight… it makes it easier for Councils to enforce those things, in contrast to a conservation covenant, unless the Council itself is a party to it, and that's unusual (NGO Expert 1 2015).
>
> If we have vegetation that needs to be retained on site we will it often protect it as a Part 5. Although it's still enforceable as a permit condition what a Part 5 does is carry it through on the title. And it's a pretty clear indicator for anyone purchasing in the future. There are also legal liability issues in terms of Part 5's which carry a bit more weight. It's also another enforcement mechanism, being party to effectively a contract that is over and above just your normal enforcement of your planning conditions. So there's times when we will use a Part 5 for biodiversity protection (Manager Planning 2 2015).
>
> I think we absolutely need to have a mechanism, like a Part 5 Agreement that allows us to create conservation areas for a range of values as part of offsets. Conservation covenants are not the answer because for one, local government just doesn't' have the ability to say something should or shouldn't be in a covenant, that's the State government (NRM 2 2015).

Despite the potential of Part 5 Agreements as mechanisms for securing biodiversity conservation outcomes, their use for this purpose remains limited.

Finally, there appears to a reluctance to use offsets, and particularly to develop a State-based approach to offsetting, on the basis that making offsets easier and more streamlined would undermine the mitigation hierarchy and provides a pathway for development where the answer should be no.

> We need to have a very firm 'no,' and so I think if the State government used offsetting, there would be that risk that they would never be allowed to say no. That they would start actually offsetting values that are irreplaceable (NRM 2 2015).

> The greatest risk of offsets is that they provide a mechanism for someone to develop something that involves an impact on something of value because they can then just say, 'Well, I'll offset it' (Ecological Consultant 2 2015).

These concerns are also expressed in other jurisdictions, where it has been found that where offsets are provided for, 'local councils are not applying the 'three step approach' and are only considering how native vegetation removal can be offset' (Webb 2009:246).

However, based on the criteria in interim schemes without offset provisions, and under the SPPs, the risk is not that offsets will be used where a proposal should be refused on the grounds that the impact is too great; rather the risk is that the proposal and associated impact will be approved without the need for any offset or demonstrated biodiversity conservation outcome at all.

Table 7.1 Percentage adoption of planning scheme criteria by region and group (one-way analysis of variance with Tukey HSD test). Raw values with the same letter are statistically identical at $p > 0.005$. Bold indicates highest value for the variable

	Criteria	North West	North	South	*Chi* ^{2}	*df*	*p* value	Group 1	Group 2	Group 3	Group 4	*Chi* ^{2}	*df*	*p* value
Acceptable Solutions														
Acceptable loss	Authorised by relevant agency	**100**	0	0	29	2	<0.001	0	0	**100**	0	24.8	3	<0.001
	Certified forest practices plan	0	**100**	0	24.2	2	<0.001	100	0	0	0	29	3	<0.001
	Within building area on approved plan of subdivision	0	0	**100**	29	2	<0.001	0	**100**	0	0	29	3	<0.001
	Maximum clearing threshold – low priority values only	0	0	**67**	15.7	2	<0.001	0	**80**	0	0	21	3	<0.001
	Impact limited to identified concepts of biodiversity	**100**	75	0	23	2	<0.001	86	0	**90**	0	22	3	<0.001
	No acceptable solution	0	**75**	17	13.1	2	0.001	**86**	20	0	0	16.7	3	0.001
Performance criteria														
Powers & functions	Substantive integration	**100**	0	83.3	21.6	2	<0.001	0	**100**	90	0	25	3	<0.001
Avoid	Avoid	**100**	87.5	**100**	2.7	2	0.257	**100**	**100**	90	100	2	3	0.579
	Significance & extent of impact	**100**	**100**	83.3	1.5	2	0.48	**100**	**100**	**100**	0	2	3	0.579
	Adverse effects on threatened species habitat	**100**	0	0	29	2	<0.001	0	0	**90**	0	24.8	3	<0.001
	Impact on objectives and outcomes	**100**	0	0	24.6	2	<0.001	0	0	**90**	0	21	3	<0.001
	Impacts in proximity	0	**88**	0	24.2	2	<0.001	**100**	0	0	0	29	3	<0.001
	Unnecessary or unacceptable impact	0	0	**75**	18.5	2	<0.001	0	**90**	0	0	24.8	3	<0.001
	Exceptional or special circumstances	**100**	0	83	21.6	2	<0.001	0	**100**	90	0	25	3	<0.001
	Irreplaceability	**100**	88	17	18.2	2	<0.001	**100**	20	90	0	18.4	3	<0.001
Minimise	Minimise	**100**	88	**100**	1.5	2	0.466	**100**	**100**	90	**100**	4.1	3	0.253
	Minimise impacts from specified activities	0	0	**83.3**	21.6	2	<0.001	0	100	0	0	29	3	<0.001
	Minimise loss, clearance or impacts of specified values	**100**	87.5	**100**	1.5	2	0.466	**100**	**100**	90	**100**	4.1	3	0.253
Mitigate	Mitigate	0	0	**100**	29	2	<0.001	0	100	0	100	29	3	<0.001
Offset	Offset	0	**88**	58	13.8	2	0.001	**100**	70	0	0	20.6	3	<0.001

Source: Content analysis of planning schemes conducted in 2017-2018 as part of this research.

Table 7.2 Offset mechanisms and principles under different regulations

OFFSET MECHANISM	FPA	EPA	ACDC	KIPS 2015	NORTHERN INTERIM SCHEMES (GROUP 1)	SOUTHERN INTERIM SCHEMES (GROUP 2)	SPP
Direct offsets							
On-site	X	X	X	X	X	X	X
Off-site	X	X	X	X	X	X	
Reservation	X	X	X	X	X	X	
Conservation covenant	X	X	X				
Transfer as public land	X	X	X	X	X		
Transfer as Crown land	X	X	X				
Transfer as Council land				X			
Part 5 Agreement	X	X		X	X	X	
Formal management agreement	X	X	X		X		
Management action	X	X	X		X		
Restoration or revegetation	X	X	X	X	X	X	
Indirect offsets							
Financial	X			X		X	
Research & knowledge	X	X	X	X	X	X	
Offset principles							
Ratios	X			X		X	
Like for like	X	X	X	X	X	X	
Certainty	X	X	X	X	X	X	
In perpetuity	X	X	X	X	X	X	
Thresholds for offsets			X				

Source: Content analysis of planning schemes conducted in 2017-2018 as part of this research.

7.3 Procedural versus substantive requirements

While the performance criteria set the tests for whether loss is acceptable or not and in what circumstances, how the discretion is exercised in making the decision establishes how these tests are applied. Procedural exercise of the discretion requires the decision-maker to have regard to biodiversity conservation in the exercise of the power or function. However it does not require the decision-maker to exercise the relevant power or function to achieve biodiversity conservation outcomes (section 1.2). Whereas, when exercising its power in a substantive sense, the decision-maker must be satisfied the development proposal satisfies the specified criteria and furthers the specified outcomes. The substantive exercise of discretion is therefore a precondition for satisfying the performance criteria as distinct from showing procedural consideration for them (Bates 2013; Preston 2013) (section 1.2).

Substantive exercise of the power or function to achieve biodiversity conservation outcomes varied significantly between groups and regions (Table 7.1). The performance criteria in the Southern interim schemes with biodiversity-related codes (Groups 2) and the North West interim schemes (Group 3) both required the decision-maker to be satisfied the development proposal achieves the specified biodiversity outcomes (Table 7.1). Therefore the performance criteria in these interim schemes provided for the substantive exercise of the power. In contrast, the North interim schemes (Group 1) only required the decision-maker to have regard to these matters in the exercise of the power or function, not to require them to exercise the relevant power or function so as to achieve results (Preston 2013). The SPPs appear to be based on the Northern interim schemes as the drafting of the performance criteria only include a procedural requirement to consider biodiversity, they do not include a substantive requirement to achieve biodiversity conservation outcomes. Consequently, while the SPPs will facilitate consistent procedural integration of biodiversity conservation into the decision-making process, they do not require outcomes for biodiversity (Dwyer & Taylor 2013; Taylor & Ives 2009). The SPPs also preclude local variation in performance criteria, limiting the ability for planning authorities to innovate and address local biodiversity pressures or provide for substantive outcomes (section 3.3.3).

7.4 Conclusion

The interim schemes and the SPPs all include acceptable solutions or exemptions which provide a permitted pathway for vegetation removal, with no ability to consider the impacts of this loss or determine if it is acceptable. While these permitted pathways are reduced under the SPPs, limited application of the code provisions via a statutory overlay and only in specified zones represents a step backwards for almost 30% of LGAs. Furthermore, the majority of interim schemes (n = 19, 68%) include a substantive requirement to achieve biodiversity conservation outcomes, whereas northern interim schemes and the SPPs only include a procedural requirement to consider biodiversity, thereby reducing the potential for biodiversity conservation outcomes.

Performance criteria under interim schemes can be broadly categorised into the different stages of the mitigation hierarchy, with a disproportionate emphasis on minimising impacts. While there are numerous provisions intended to avoid unacceptable loss under both the interim schemes and SPPs, these criteria are not explicit or robust. Consequently, the avoid stage of the mitigation hierarchy was effectively absent. The mitigation stage was also limited in its adoption and while offsets are provided for, implementation was limited due to the lack of a coordinated approach and perceived limitations of Part 5 Agreements as the only private land protection mechanism available. Under the SPPs, while offset provisions will exist in all schemes, they appear to be restricted to on-site offsets.

Consequently, the interim schemes and the SPPs constrain the ability of planning authorities to determine a loss is unacceptable, or where it is determined to be acceptable, to require offsets. Northern interim schemes and the SPPs also fail to require the biodiversity conservation outcomes specified in the criteria are achieved, only requiring they are taken into consideration. As a result, the focus of these schemes was on procedural integration of biodiversity over substantive integration. The emphasis on the procedural integration at the expense of the substantive appears to be based on the assumptions that: (i) loss as a result of land use planning decisions is not worth counting; (ii) meaningful conservation outcomes cannot be achieved at the scale of local planning authorities; and, (iii) offsets are impractical and not cost-effective to implement. Chapter 8 tests the validity of these assumptions by evaluating the effectiveness of biodiversity conservation outcomes within the Kingborough LGA.

Chapter 8 - Achieving effective outcomes for biodiversity: Kingborough case study

Chapters 4-7 identified perceived limitations in the effectiveness of planning schemes in regulating impacts and achieving biodiversity conservation outcomes, with outcomes restricted to municipal boundaries, the small scale and extent of loss not cost effective or practical to regulate at the scale of a local government area (LGA) and available protection mechanisms not secure. In this Chapter I employ a case study of the Kingborough LGA to test the validity of these concerns evaluating the effectiveness of biodiversity conservation actions at the local scale, including the extent of loss relative to gain, the role of offsets and the effectiveness of protection mechanisms imposed via planning permit conditions.[33]

8.1 Kingborough

The Kingborough LGA is located south of Hobart and includes the Channel and Bruny Island (Figure 8.1). With an area of 72,010 hectares and a population of 36,263, Kingborough is a large LGA within a Tasmanian context (Australian Bureau of Statistics 2016). Three percent of the LGA is urban, with the northern portion of the LGA within the Greater Hobart Metropolitan Area. The remainder of the LGA is rural (22.7%) or native vegetation (73.18%).

Kingborough has experienced sustained levels of population growth over the past 20 years, with a growth rate in excess of the Tasmanian average (Kingborough Council 2018). Kingborough also has over 350 hectares of native vegetation within areas identified for development, 75% of which is mapped as threatened native vegetation and 100% is identified as potential habitat for threatened species (Knight & Cullen 2012).

Kingborough has experienced 6 regulation changes during the case study period (2000-2018) in relation to biodiversity conservation, as a result of the introduction of new planning schemes, amendments to biodiversity provisions within planning schemes or amendments to regulations (Table 8.1). Kingborough was an early adopter of performance-based planning in Tasmania with the introduction of the Kingborough Planning Scheme 2000 (KPS 2000) in 2004. KPS 2000 included a protected vegetation schedule (Schedule 10) which was applied textually, across all zones, had limited exemptions, relied upon field verification rather than desk-top data for identification of biodiversity and included explicit provisions enabling consideration of biodiversity. These provisions were strengthened to address the gap created by the changes to the *Forest Practices Regulations* and the decision of the Resource Planning and Appeals Tribunal in *H and A van Beelan v Kingborough Council* ([2010] TASRMPAT 245) and resulted in Kingborough being the only LGA to have an

[33] This chapter draws on the results of the Kingborough case study (section 2.2), including the audit of loss, gains and risk (section 2.2.1), the audit of offsets (section 2.2.2) and the audit of protected areas (section 2.2.3).

explicit head of power for offsets through statutory planning under pre-interim scheme. The amended Schedule 10 also included strict replacement ratios where on-site offsets were relied upon.

The biodiversity provisions currently in effect are under the Kingborough Interim Planning Scheme (KIPS 2015), principally via the Biodiversity Code (Code E10.0), but also via zone provisions. While under the KIPS 2015, Code E10.0 is applied by statutory map, the extent of the statutory map is such that it applies to 98% of native vegetation within the LGA. Consistent with the former Schedule 10, Code E10.0 also applies irrespective of zone and type of development, provides for field verification and incorporates tests for special circumstances and the mitigation hierarchy. Code E10.0 differs from Schedule 10 in two key respects: (i) Code E10.0 captures broader concepts of biodiversity including native vegetation, not just threatened native vegetation communities, as well as significant and potential threatened species habitat at a range of scales, from individual trees to landscape-scale habitat; (ii) provides for an expanded range of special circumstances, including relaxing the replacement ratios required for reliance on in-situ offsets.

While based on regional model provisions, the KIPS 2015 differs from other interim schemes in that it includes definitions for significant and potential habitat consistent with those used in the FPS and explicitly links offset requirements to a specified Council Biodiversity Offset Policy. Kingborough remains the only planning authority in Tasmania to routinely use biodiversity offsets to mitigate impacts and Part 5 Agreements to protect biodiversity values in perpetuity and is seen by many as a leader in integrating biodiversity conservation into land use planning.

> Kingborough is doing really, really well like I think that is the top one yeah (State Expert 3 2015).
>
> I think Kingborough's like the example Council in Tasmania. I think Kingborough is actually doing the absolute right thing. That's where ... the standards should be (Ecological Consultant 4 2015).

However, reflective of broader concerns with the offsets, not everyone shares the view that the approach adopted by Kingborough is achieving effective outcomes.

> I don't think biodiversity offsetting in Kingborough is really winning. It's not winning and it's not replacing what's going. It's making some good recreational spaces… But we're kidding ourselves if you think we're doing anything other than losing. We're all losing (Ecological Consultant 1 2015).

The intersection of high population growth, development pressure and areas important for biodiversity, combined with Kingborough's innovation in the integration of biodiversity conservation into statutory planning, make Kingborough an ideal case study to establish the role and effectiveness of land use planning broadly and the approach adopted by Kingborough specifically. The purpose of the case study is to evaluate:

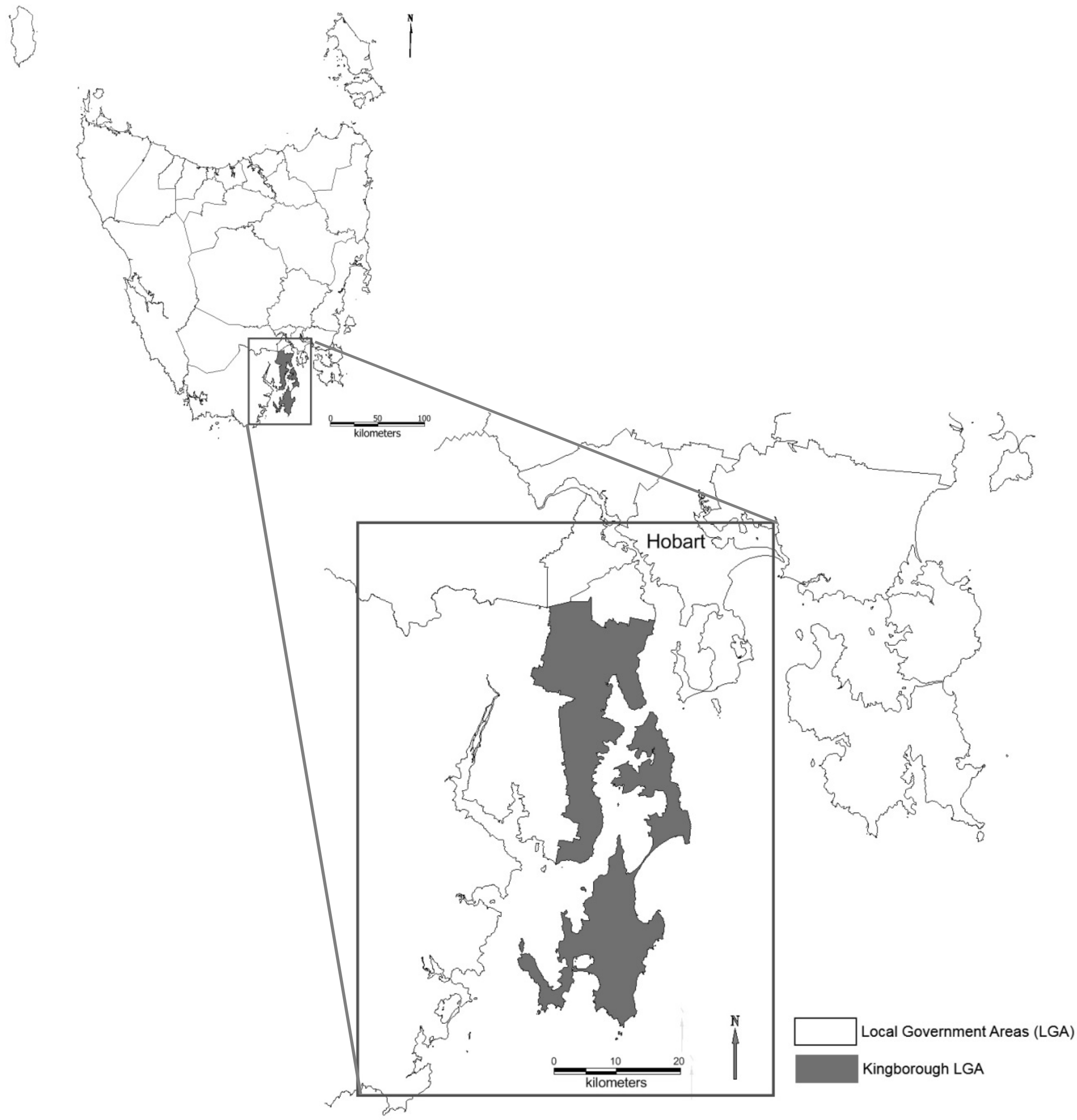


Figure 8.1 Kingborough LGA
Source: The LIST (2015b)

1. the extent and significance of loss and associated gains within the Kingborough LGA over time as a result of land use planning decisions (sections 8.2 and 8.3);
2. the contribution and effectiveness of offsets, including compliance with the identified offset principles of avoidance, additionality, equivalency, certainty and security (section 8.4);
3. the contribution and effectiveness of Part 5 Agreements to securing biodiversity conservation outcomes in perpetuity (section 8.5); and,
4. the implications of the State Planning Provisions (SPPs) for offsetting loss and achieving biodiversity conservation gains (section 8.6).

Table 8.1 Biodiversity regulation changes during the case study period

Reform No.	Planning instrument	Timeframe	Key characteristics
1	Pre-KPS 2000	Pre-2004	No explicit biodiversity provisions or head of power for offsets except where provided for under external regulations including the FPS and EPBCA.
2	KPS 2000	2004 - Oct 2009	Introduction of model template planning scheme including a protected vegetation schedule (Schedule 10). Applied textually where values are present, irrespective of zone. No explicit head of power for offsets but provided discretion when supported by FPS & EPBCA.
3	KPS2000 without FPA	Oct 2009 - end 2010	Changes to the FPR, removing any role of the FPA in regulating loss from development under LUPAA.
4	KPS 2000 post-van Beelan decision	End 2010 - end 2012	Tribunal decision resulted in loss of head of power for offsets under Schedule 10. Priority vegetation removal & offset requirements determined by suitably qualified person not the regulator.
5	KPS 2000 post Schedule 10 amendment	End 2012-July 2015	Amendment to Schedule 10 to provide explicit head of power for offsets for threatened vegetation & some habitat. Applied textually, across all zones. Relied upon field verification. Tests include demonstrating exceptional circumstances & mitigation hierarchy satisfied. Strict replacement ratios establishing thresholds for on-site retention. No consideration for significant or potential threatened species habitat or individual trees.
6	KIPS 2015	July 2015-present	Introduction of the interim planning scheme including a Biodiversity Code. Code applied via broad statutory map encompassing 98% of native vegetation across all zones. Provides consideration for a range of biodiversity values Provides for field verification. Provides explicit head of power for offsets but special circumstances are relaxed.
7	Tasmanian Planning Scheme	In progress	Not yet in effect. Concepts of biodiversity broader. Applied via statutory map. Field verification limited. Excludes specified zones & activities resulting in considerable exemptions. Tests procedural & weak, with offset on-site only in limited circumstances.

8.2 Loss

From 2000-2018, an estimated 123.7 hectares of native vegetation cover was lost within the urban growth area (UGA) of Kingston/Blackmans Bay (Figure 8.2). Ninety-five percent (117 hectares) of this was located within an urban residential zone (including the general residential, low density residential and inner residential zones). Patch size ranged from 0.06 to 15.27 hectares, with an average patch size of 2.13 hectares. Within the UGA, there is a significant relationship between extent of loss of native within the UGA and development type ($F = 2.22_{7/57}$, $p = 0.048$), with 75% of loss a result of subdivision, 10% for multiple dwellings, 8% for State road infrastructure and other developments including industrial (3%), education (1.7%), commercial (1.5%), single dwellings (0.7%) and telecommunications (1%) (Figure 8.3). Of the 123.7 hectares lost within the UGA, 52.65 hectares (42.7%) were subject to an offset. Of this vegetation, 38 hectares (45%) was a listed threatened native vegetation community including 26 hectares of *Eucalyptus amygdalina* forest and woodland on sandstone (DAS) (30%), >11 hectares of *Eucalyptus ovata* forest (DOV), (14%) and 42.53 hectares of threatened species habitat (50%) (Figure 8.6). Within the UGA, 715 individual trees were also approved for removal subject to an offset during this time as part of development applications, [34] with 93% (*n* = 666) located in urban residential zones. The majority of these trees were considered to be high conservation value trees,[35] including: *Eucalyptus ovata* with a dbh >40cm (*n* = 551, 71.5%); *E. viminalis* with a dbh >25cm (*n* = 150, 21%); *E. globulus* with a dbh >40cm (*n* = 59, 8.3%) and/or mature eucalypts with a diameter >70cm (*n* = 445, 62.2%) (Figure 8.5).

At the scale of the LGA, data on loss are only available where the loss was offset (section 2.2.1). In total, 85.7 hectares of native vegetation and 937 individual native trees were removed across Kingborough from 2000-2018, subject to an offset. Of the individual trees removed, as with the UGA, the majority were located in residential zones (*n* = 760, 81%), and were *Eucalyptus ovata* trees with a diameter greater than 40cm (*n* = 598, 35%) and/or mature eucalypts with a diameter greater than 70cm (*n* = 501, 30%) (Figure 8.5). Of the native vegetation removed, 69% (59 hectares) provided habitat for threatened species, 59% (51 hectares) was a threatened native vegetation community and 4.8% contained threatened flora (Figure 8.6). DAS was the most impacted threatened native vegetation community (29.7 hectares) followed by 13.5 hectares of DOV, 7 hectares of *Eucalyptus tenuiramis* forest on sediments (DTO) and 7 hectares of *Eucalyptus globulus* dry forest (DGL) (Figure 8.6).

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[34] Data are only available on individual tree loss resulting from development approvals where this loss was subject to an offset.

[35] Under Biodiversity Offset Policy (6.10), offsets are required for the removal of high conservation value (HCV) trees, with a HCV tree defined as a tree providing potential or significant habitat for a threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) or the *Threatened Species Protection Act 1995* (TSPA) (Kingborough Council 2016a). Species and diameter thresholds are further specified as surrogates for high conservation value trees, with the data on tree removal a direct reflection of these thresholds.

Consistent with vegetation loss in the UGA, the majority of loss across the LGA was the result of subdivision (66%), State road infrastructure (12%) and multiple dwellings (6%) (Figure 8.4) and the loss was predominantly in the residential type zones (82%). However, in contrast to the UGA, single dwellings and development within the Environmental zones also contributed to 15% of the loss across the Kingborough LGA, with the remaining loss in rural and commercial zones.

Biodiversity loss, including threatened species habitat, native vegetation, threatened native vegetation and individual trees within the UGA and across the LGA, varied depending upon the regulations in effect at the time (Tables 8.2 and 8.3 and Figure 8.7). The highest levels of loss of native vegetation, threatened native vegetation, DOV and swift parrot habitat all occurred prior to the introduction of KPS 2000 or the routine use of offsets (Tables 8.2 and 8.3 and Figure 8.7). While the extent of loss declined, the percentage of proposals involving the loss of individual trees and threatened species habitat increased significantly with changes in regulations (Table 8.3). This variation could be interpreted as meaning loss of individual trees and habitat has increased in response to regulation changes. However, it is more likely to reflect the strengthening of the regulations under the KIPS 2015 to include significant and potential threatened species habitat at a range of scales, from individual trees to landscape-scale habitat. Loss of habitat and individual trees may or may not have been occurring at similar or higher rates historically. However there was no mechanism within the regulations in effect to enable consideration of this loss. Therefore it was not counted or offset.

8.3 Gains

Since the introduction of offsets in Kingborough in 2003, 187 individual offsets totalling 202 hectares have been secured for the loss of 85.7 hectares of native vegetation and 937 individual native trees. Offsets have been predominantly for small losses, with 68% (n = 128) of offsets being for the loss of individual trees assessed as high conservation value, 36% (n = 61) for small patches of threatened vegetation (M= 1.28 hectares) and 26% (n = 49) for small areas of threatened species habitat (M = 0.42 hectares), excluding individual trees.

A key driver of offsets within Kingborough broadly and the UGA specifically was the regulations in effect at the time (chi^2 = 62.1, df = 10, p < 0.001) (Table 8.4). Prior to the introduction of KPS 2000, 67.8 hectares of vegetation was lost and only 22.5% of this loss was offset (Figure 8.7). Following the introduction of a performance-based planning scheme with biodiversity provisions (KPS 2000), offsets became routine, with all development applications involving loss of native vegetation between the introduction of KPS 2000 and the van Beelan decision also requiring an offset for this loss (Table 8.4 and Figure 8.7). During this time offsets were initially driven by external regulators including the Forest Practices Authority (FPA) under the *Forest Practices Regulations* and the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). Offsetting continued following the changes to the *Forest Practices Regulations* until the van Beelan decision, when the number of proposals offset declined by 40% following the approval of two developments involving the loss of 3.34 hectares of DAS without any offsets (Table 8.4, Figure 8.7). Following the amendment of Schedule 10 to provide an explicit head of power for offsets, offsetting returned to previous levels with all developments involving loss requiring an offset either for the extent of vegetation removed, or for the removal of individual trees (Table 8.4). The introduction of KIPS 2015 saw offsetting continue for all developments within the UGA and across the LGA (Table 8.4).

Of the offset mechanisms used across the LGA, 23% (n = 43) of offsets were direct, resulting in the protection of 158 hectares of biodiversity across the LGA and 60 hectares of biodiversity within the UGA (Figure 8.8). The extent of direct offsets within the UGA varied significantly depending upon the regulations in effect at the time ($F = 2.99_{5/57}$, $p = 0.014$), with direct offsets associated with KPS2000 prior to the changes to the FPS, KPS 2000 post-Schedule 10 amendment and KIPS 2015.

Of the 835 indirect offsets, 82% (n = 156) involved financial contributions totalling $938,308 (Figure 8.8), with 69% of these contributions resulting from loss within the UGA. Financial contributions, which are paid into a fund set aside to either protect or restore equivalent values off-site at a later date, are relied upon for predominantly small scale losses (n = 156, M = 0.325 hectares), as part of a broader package of offsets (n = 12) or for the loss of individual trees (n = 128). Without the option for a financial contribution, the small-scale of these losses mean the loss would otherwise not be feasible to offset. However, the potential benefit of financial contributions relies upon the effects of expenditure.

> If you're taking money from people you have to clearly provide a direct path of how it is then spent for the attainment of the objectives which has been taken (Consultant Planner 1 2015).

Guidelines have been developed by Kingborough Council to provide a transparent and consistent framework for the expenditure of funds from the Kingborough Environmental Fund in a manner consistent with Council's Biodiversity Offset Policy (Kingborough Council 2016b).

Other indirect offsets include contributions to recovery actions, which have only been required on three occasions. Consistent with the Offset Policy, these indirect offsets are only an option as part of a broader offset package, hence their limited usage (Kingborough Council 2016a).

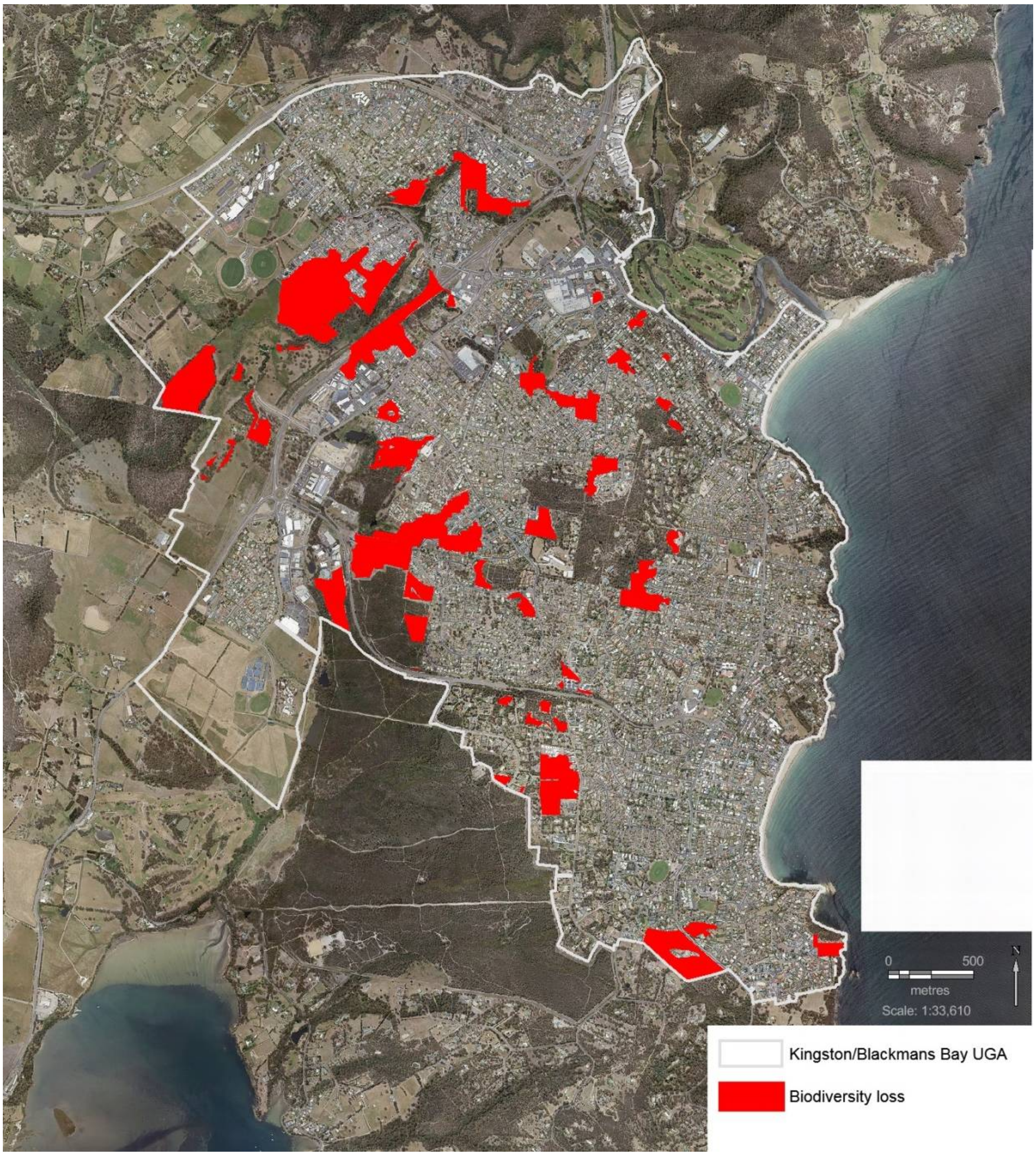


Figure 8.2 Extent of native vegetation loss in the Kingston/Blackmans Bay Urban Growth Area (UGA) from 2000-2018

Source: Audit of biodiversity loss, gain and risk within the UGA from 2000-2018, conducted in 2018 as part of this research. Data derived from: Council records of development applications; satellite imagery; and, Resource Management and Conservation (2006a).

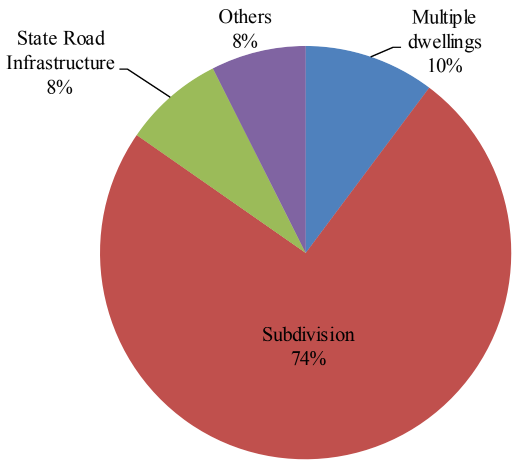


Figure 8.3 Percentage of native vegetation loss in the Kingston/Blackmans Bay UGA by development type from 2000-2018

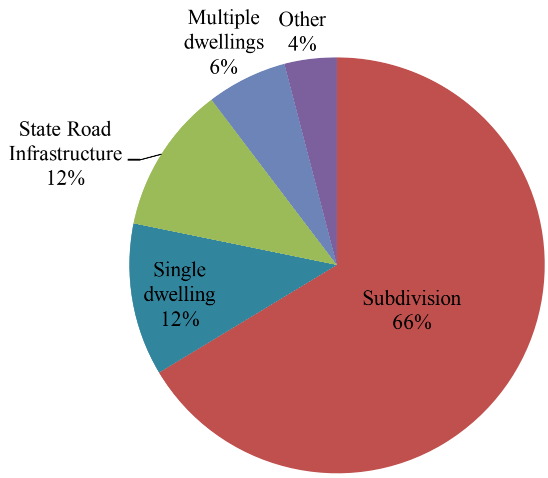


Figure 8.4 Percentage of native vegetation loss in the Kingborough LGA by development type from 2000-2018

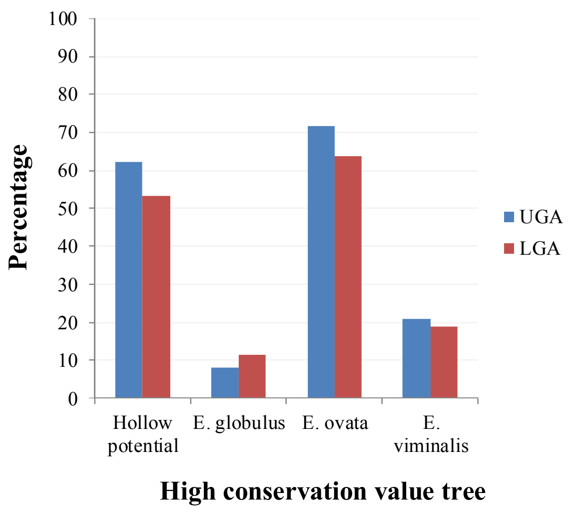
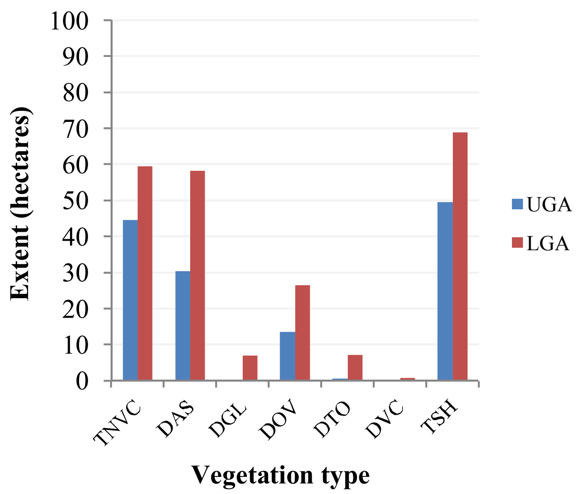
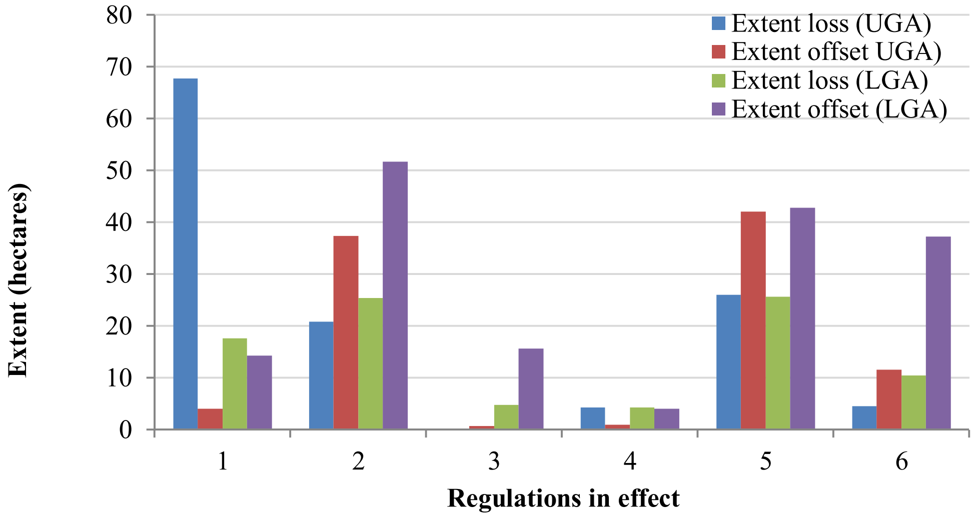


Figure 8.5 Percentage of high conservation value tree loss by class from 2000-2018



TNVC – Threatened native vegetation community; DAS – *Eucalyptus amygdalina* forest and woodland on sandstone; DGL – *Eucalyptus globulus* dry forest and woodland; DOV – *Eucalyptus ovata* forest and woodland; DTO – *Eucalyptus tenuiramis* on sediments; DVC – *Eucalyptus viminalis-Eucalyptus globulus* coastal forest and woodland; TSH – threatened species habitat.

Figure 8.6 Extent of native vegetation loss by vegetation type from 2000-2018



1 – Pre-KPS 2000 (pre-2004); 2 – KPS 2000 (2004-2009); 3 – KPS 2000 without FPA (2009-2010); 4 - KPS 2000 post van Beelan decision (2010-2012); 5 - KPS 2000 post schedule 10 amendment (2012-2015); and 6 - KIPS 2015 (2015-present).

Figure 8.7 Extent of loss and extent of offset under different regulatory contexts from 2000-2018

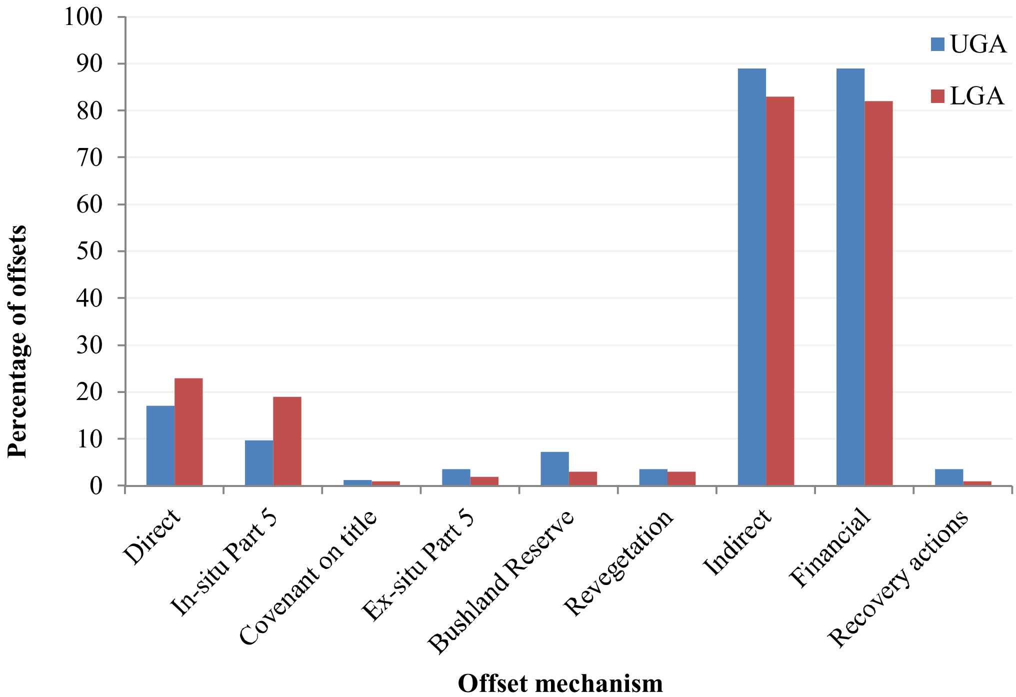


Figure 8.8 Percentage of offsets by offset mechanism from 2000-2018

Source of Figures 8.3 - 8.8: Audit of biodiversity loss, gain and risk within the UGA from 2000-2018; and, audit of loss and gains subject to offsets from 2000-2018; both conducted in 2018 as part of this research. Data derived from: Council records of development applications; satellite imagery; and, Resource Management and Conservation (2006a).

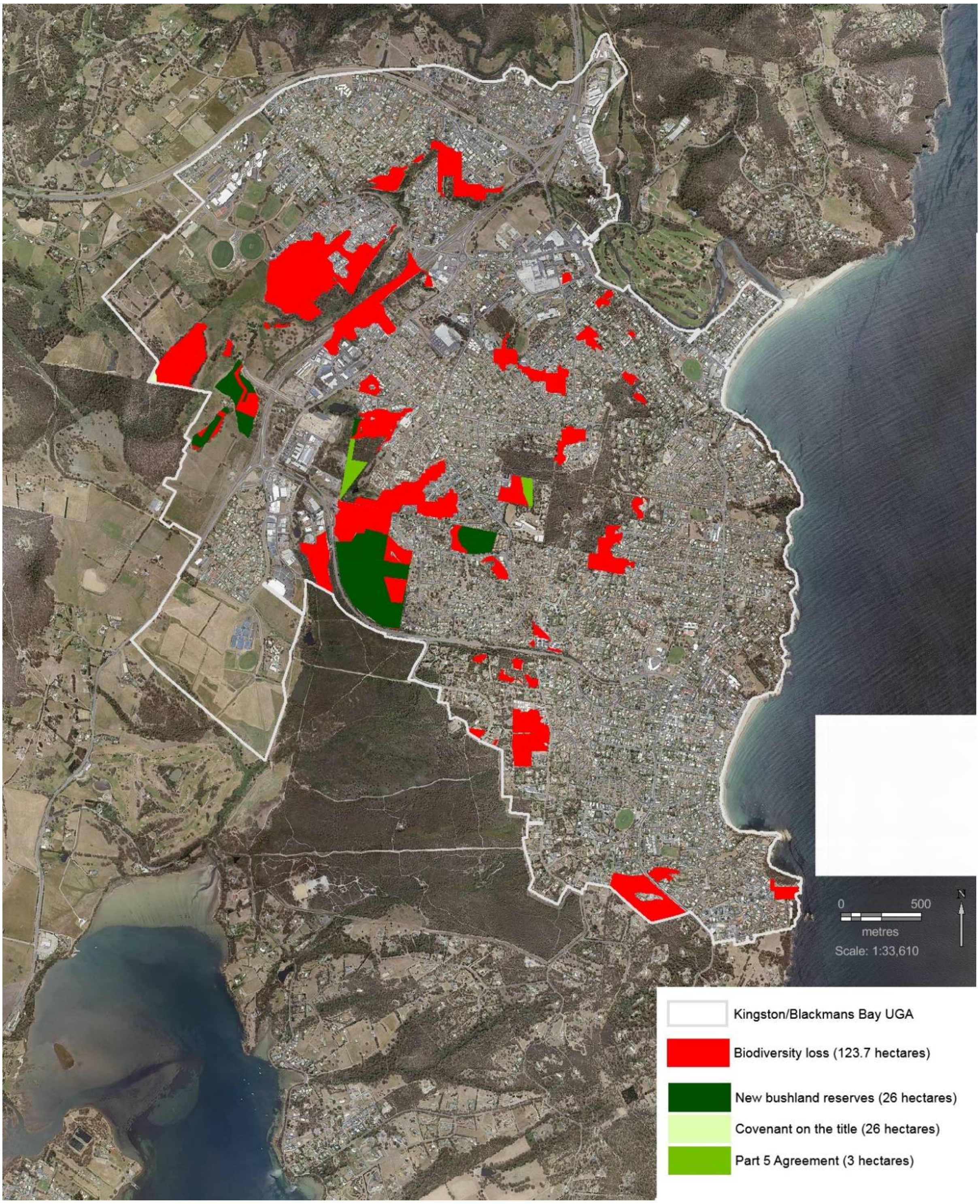


Figure 8.9 Extent of losses and gains within the Kingston/Blackmans Bay UGA from 2000-2018

Source: Audit of biodiversity loss, gain and risk within the UGA from 2000-2018, conducted in 2018 as part of this research. Data derived from: Council records of development applications; satellite imagery; and, Resource Management and Conservation (2006a).

8.4 Evaluation of offsets

It is evident from the analyses of loss and gains that Kingborough Council has secured numerous offsets and generated considerable financial revenue. The offset approach adopted by Kingborough is simple compared to the metrics adopted in other jurisdictions (State of New South Wales 2008a; State of Victoria 2013) or metrics recommended in the literature (Bekessy et al. 2010; Bradshaw & Brook 2010; Bull, Suttle, Gordon, et al. 2013; Butler 2009; Carreras Gamarra, Lassoie & Milder 2018; Gibbons et al. 2016). To determine the contribution and effectiveness of these offsets to biodiversity conservation at the local level, an evaluation of these offsets in relation to the key offset principles of avoidance, additionality, equivalency, currency, location, timing and security is required (Brown et al. 2014; Gardner et al. 2013; Maron et al. 2016; Maron, Rhodes & Gibbons 2013; McKenney & Kiesecker 2010; Preston 2016; Webb 2009).

Avoidance

A key concern with offsets is that where offsets are provided for, the mitigation hierarchy is not followed and impacts are not avoided (McKenney & Kiesecker 2010; Webb 2009). The Kingborough Biodiversity Offset Policy establishes the importance of avoidance by specifying that offsets are only available where all opportunities to avoid and mitigate impacts have been exhausted (Kingborough Council 2016a). A development was taken to have avoided impacts where values equivalent to those being impacted had been retained to some extent. These avoidance areas may remain vulnerable to future loss unless they are secured either: (i) as an offset; or (ii) in order to satisfy other planning scheme requirements such as zone standards.

There was a significant variation in the percentage of developments which achieved a level of avoidance under different regulations within the UGA (chi^2 = 68.4, df = 5, p = 0.017) and the LGA (chi^2 = 85.5, df = 5, p = 0.001) (Table 8.4). Avoidance of impacts generally increased with regulation changes, with the highest percentage of avoidance under the current biodiversity provisions within KIPS 2015 (Table 8.4). The experience of Kingborough also shows a general trend of a decline in the extent of loss coinciding with an increase in offsets (Figure 8.7), countering the concern that offsets undermine avoidance by allowing development that would otherwise not be permitted (Norris 2014).

Notwithstanding, there is also a significant relationship between avoidance and the type of development (chi^2 = 45.5, df = 15, p < 0.001). While 56% (n = 9) of development types avoided impacts to some extent in all instances and 31% of development-types (n = 5) avoided impacts more than 50% of the time, commercial developments only avoided impacts 43% of the time and multiple dwellings only avoided impacts in 18% of instances. Conversely, where multiple dwellings were involved, loss was total in 82% of instances. Therefore, while offsets have not negated the principle of avoidance, avoidance is not always achievable, hence the need for offsets.

Additionality

Additionality refers to the concept that an offset generates benefits additional to those that would otherwise have occurred under the status quo (Brown et al. 2014; Maron et al. 2016; Maron, Rhodes & Gibbons 2013; McKenney & Kiesecker 2010). Offsets based on protecting sites that have no capacity for improvement or are not at risk or under threat of decline are generally not considered to provide additional benefits (Gibbons & Lindenmayer 2007). While the principle of additionality is not explicitly identified within the Kingborough Offset Policy (Kingborough Council 2016a) or the Southern Regional Offset Guidelines (Southern Tasmanian Councils Authority 2013), it is implicit in the requirement that offsets deliver a net benefit for conservation, which is achieved by an increase in security (or reservation status) coupled with active management for a specified period.[36]

The percentage of developments satisfying the principle of additionality had a significant relationship to the regulations in effect within the UGA ($chi^2 = 29.7$, $df = 5$, $p < 0.001$) and across the LGA ($chi^2 = 17.1$, $df = 5$, $p = 0.004$). Initially a lower percentage of developments required additionality, with 14% of early offsets (pre-KPS 2000 and KPS 2000 with the FPA) being used for the management of existing reserves. This practice was short-lived and since the introduction of an Offset Policy in 2010 all offsets have achieved additionality either directly through the establishment and ongoing management of new public bushland reserves, or protection of private land in perpetuity under Part 5 Agreements in areas previously identified for development, or indirectly through financial contributions which are required to be utilised for the protection of new areas for conservation or the establishment of new areas of habitat through restoration.

Equivalence

Like-for-like, or equivalence between biodiversity losses and gains expected from offsets is necessary in order for offsets to effectively contribute to minimising development impacts on biodiversity (McKenney & Kiesecker 2010; Quétier & Lavorel 2011; ten Kate, Bishop & Bayon 2004). Equivalence requires the habitat, vegetation type, species, or other attributes secured via an offset to be equivalent to, or the same as, those impacted by the development.

In many jurisdictions a metric is used to calculate equivalence. In Tasmania there is no agreed metric and equivalence is determined on a case-by-case basis predominantly based on vegetation classification and conservation status, the condition of the vegetation using the Vegetation Condition Assessment (VCA) method, the presence of threatened species or their habitat and other characteristics of the area impacted relative to the area protected. Accordingly, in theory, if the vegetation being cleared is moderate condition DAS with Chaostola skipper habitat and mature trees, the offset secured also contains DAS in at least moderate condition with Chaostola skipper habitat and mature trees.

[36] Additionality is discussed in more detail below within the context of on-site averted loss offsets.

Using this concept of equivalence, 93% of offsets sought to achieve equivalence. A further 2.5% of offsets achieved partial equivalence, where part of the offset site contained equivalent values but the extent was insufficient. Offsets did not achieve like-for-like outcomes in 4.5% of cases.

There was significant variation under different regulations in the percentage of offsets satisfying the principle of equivalence, particularly under earlier offsets arrangements where equivalence was achieved less frequently (chi^2 = 43.5, df = 5, p < 0.001) (Table 8.4). While equivalence is well-accepted as a principle, it also well-accepted that equivalence is negotiable in the right circumstances (Brown et al. 2013b). Under Clause 5.10 of the Kingborough Offset Policy, the right circumstances are considered to exist where it is demonstrated that the offset achieves a significantly enhanced conservation outcome. To illustrate, the loss of 0.486 hectares of DAS containing Chaostola skipper habitat in relatively poor condition was offset by the protection under a Part 5 Agreement in perpetuity of 1.95 hectares of *Eucalyptus pulchella* dry forest (DPU) containing a known records of the Tasmanian devil and the Eastern-barred bandicoot, as well as the only known record of the winter sun-orchid (*Thelymitra hiemalis*) in Tasmania. In this instance it was determined by the Planning Authority that, while the biodiversity protected was not equivalent to that being impacted, the characteristics and extent of the offset site was sufficient to represent a net conservation benefit. While exceptions are made, analysis of offsets in Kingborough demonstrates the principle of equivalence is generally upheld.

Currency and replacement ratios

Currency refers to the trading units used to exchange biodiversity loss for biodiversity gain (McKenney & Kiesecker 2010). Within Victoria, this unit is determined using the habitat hectares method. In Tasmania there is no metric for determining the value of the trading unit, with the VCA method sometimes applied in a manner similar to habitat hectares but in most instances the currency is based on area. Replacement ratios are generally required to achieve a ratio of between 3:1 and 5:1(Forest Practices Authority 2017; Kingborough Council 2016a; Southern Tasmanian Councils Authority 2013). Based on these ratios, for every 1 hectare of a value lost, an offset site of between 3-5 hectares with equivalent values was required, with replacement ratios able to be adjusted taking into consideration quality, additional values and risk.

Within the Kingborough LGA, the average replacement ratio achieved was 4.8:1, indicating ratios were consistent with the higher end of the policy requirements. Replacement ratios were greater for direct offsets, with a mean ratio of 5.9:1 compared to a mean ratio of 4.5:1 for indirect offsets. There was also a difference between offset ratios and equivalence, with partially equivalent offsets achieving greater ratios (M ratio = 9.23:1) than equivalent offsets (M ratio = 4.6:1) or offsets which were not like for like (M ratio = 3:1). This indicates higher ratios were being partially relied upon to demonstrate an increased conservation gain.

Location of the offset relative to the impact site (on-site versus off-site)

There is a broad consensus that offsets should be located in proximity to the affected area (McKenney & Kiesecker 2010). Within Kingborough there is a significant relationship between on-site offsets and equivalence (chi^2 = 25.6, df = 2, p < 0.001), with 82.5% of on-site offset achieving equivalence compared to only 50% of off-site offsets. Of the 158 hectares of direct offsets within the LGA, 102 hectares (65%) were on-site offsets, with 101 hectares (67%) on private land under Part 5 Agreements and 33% via the creation of new bushland reserves transferred to Council ownership. Within the UGA, 29 hectares of biodiversity were secured via on-site offsets, with 88% (n = 5, 26 hectares) via new bushland reserves, 10% (n = 2, 3 hectares) via in-situ Part 5 Agreements and 1% (n = 1, 0.26 hectares) under a covenant on the title (Figure 8.9). While one off-site offset was located in Glamorgan-Spring Bay, all other off-site offsets have been within the LGA. These results reflect the Southern Regional Offset Guidelines and the regulations and associated policy settings within Kingborough (Kingborough Council 2016a; Southern Tasmanian Councils Authority 2013). These results may also be explained by the lack of an offset market in Tasmania, with on-site offsets the only available option.

A significant relationship exists between the regulations in effect and the percentage of proposals within the UGA involving in-situ Part 5 Agreements (chi^2 = 16.6, df = 5, p = 0.005) and the creation of bushland reserves transferred to Council (chi^2 = 34, df = 5, p < 0.001), (Table 8.4). All offsets creating new bushland reserves were secured either under the amended Schedule 10 or KIPS2015 (Table 8.4). These bushland reserves range in size from 0.5 hectares to 14.75 hectares and contain threatened native vegetation communities, threatened species populations and threatened species habitat. The largest of these bushland reserves is the Algona Reserve (14.75 hectares), which contains DAS in moderate-good condition, a number of threatened flora records and eastern barred bandicoot habitat as an on-site offset for the loss of 6.66 hectares of poor condition DAS with eastern barred bandicoot habitat. Algona Reserve is immediately adjacent to the newest bushland reserve (Wattle Street), resulting in a combined on-site reserve area of 17.1hectares (Figure 8.9). One of the smaller more isolated bushland reserves is Hawthorn Drive, a 3.16 hectare reserve created as an offset for the clearance of 0.9 hectares of equivalent vegetation in poorer condition. The smallest reserve is within Kingston Green, a small bushland reserve 0.5 hectares in site and adjacent to a larger reserve protected under a Part 5 Agreement.

The greenfield sites of Algona Reserve, Hawthorn Drive, Kingston Green and Wattle Street were all zoned residential and therefore considered suitable for residential development. However these sites were also entirely covered in threatened native vegetation, with Algona Reserve, Hawthorn Drive and Wattle Street also containing endangered flora and fauna species and Hawthorn Drive containing threatened species habitat. Under the status quo, these bushland areas would continue to degrade due to lack of management and external threats such as recreational vehicle access, weeds, inappropriate fire regimes and wood hooking. Prior to the amendment to Schedule 10, these areas were at risk of total loss for subdivision or multiple-dwellings. Under the amended Schedule 10 a level of development was provided for and consequently a level of loss accepted. However, the extent of loss was linked to demonstrating exceptional circumstances and the only exceptional circumstance available to developments such as subdivisions was to demonstrate either (i) the patch of vegetation was not viable to retain in the long-term irrespective of management intervention; or (ii) the scale of the clearing was limited relative to the remaining vegetation on site (Kingborough Council 2000) (Table 8.1). Further to this, to rely on the limited scale of clearing, minimum on-site offset ratios must be satisfied, resulting in a non-negotiable level of on-site retention (Kingborough Council 2000). In the cases of the Algona, Kingston Green and Hawthorn developments, this resulted in an average of 25% of the sites being developed and 75% protected and under active management. While the on-site offset ratios are relaxed under KIPS 2015 from strict ratios to a substantial proportion, satisfying special circumstances for larger losses of viable native vegetation still relies upon a high level of in-situ protection, which is reflected by the levels of retention (Table 8.1).

Two potential issues with preferencing on-site offsets are: (i) the reliance on averted loss offsets; and, (ii) limited consideration of reserve design principles. Averted loss offsets can only generate additionality where, in the absence of the offset, the site would have been subject to ongoing decline, as a level of acceptable loss is implicit in the offset ratio (Curran, Hellweg & Beck 2014; Maron et al. 2012) (section 5.2.3). For the purposes of this research, averted loss offsets within urban-type zones are accepted as a gain for biodiversity and legitimate offsets, as the zone purpose is intensive development and the biodiversity is at risk of inappropriate management. Averted loss offsets in urban areas are also a useful mechanism to secure biodiversity conservation outcomes in areas where inflated land prices otherwise limit investment in conservation (Bekessay et al. 2012). Averted loss offsets are more difficult to justify where the offset is located within an environmental type zone, as development is considered secondary to management of the natural values. Notwithstanding, the zone standards within environmental zones provide for a range of developments and in the absence of additional protections, biodiversity remains vulnerable to clearance or modification for developments including subdivision, residential development and tourism development. While the footprint of the developments themselves may not be significant, clearing for bushfire hazard management and access can be. There is also the potential for environmental-type zones to be rezoned to a more intensive zone, and inappropriate management can also result in clearance and conversion over time. Even where areas are identified for preservation via strategic planning processes, these areas are subsequently consumed by peri-urban development under future iterations of the plans, all within established legal, scientific and economic systems (McFarland 2015). Therefore, securing averted loss offsets within environmental zones is considered to provide an additional and worthwhile level of protection which establishes limits to clearance and development beyond the life of an individual planning scheme.

The preferencing of on-site averted loss offsets also has the potential to result in the protection of areas which do not make a meaningful contribution to the Reserve Estate due to their location in the landscape and/or their size. While the State has criteria for reserve-design and a minimum size threshold of 10 hectares for conservation covenants, there are no guidelines on the location or size of an area able to be relied upon as an offset. Consequently, within Kingborough there are on-site offsets as small as 900 m^2 located within urban areas. The conservation benefits of maintaining such small patches may not be justifiable in some circumstances.

> So you've got a little patch of bush in the middle of, or very close to an area of urban development, then you've really got to ask yourself, 'How are we going to manage that? Is it really the place to be managing conservation?' (Ecological Consultant 2 2015).

For some values, such as a threatened native vegetation community, small-scale retention may not be meaningful for conservation or cost effective below certain size thresholds. However, for other biodiversity, such as individual species, maintaining small patches of remnant vegetation can be of critical importance (Kirkpatrick & Gilfedder 1995). The broader environmental, social and economic benefits of maintaining urban biodiversity, including mature trees and small patches of remnant vegetation, is also increasingly recognised.

Notwithstanding, suitability criteria for offset sites, whether on-site or off-site, are needed. These criteria need to be species or value specific and clarify the criteria necessary for a site to be eligible as an offset for the relevant value and in what circumstances. These criteria should consider reserve design principles, landscape characteristics such as size, location, edge-area ratio, management requirements and ecological characteristics, as well as take into consideration the level of risk or threat to the value (Bekessay et al. 2012; Horák 2016).

Timing and certainty

A criticism of offset policies has been the lack of requirement for offsets to be established at the time of impact, resulting in a time lag between losses and gains (Gibbons & Lindenmayer 2007). The timing of an offset is critical to achieving conservation outcomes, as schemes that allow trading the immediate loss of existing biodiversity for future gains create a greater risk of failure, thereby undermining equivalency (Bekessy et al. 2010; Gibbons & Lindenmayer 2007; Maron et al. 2012; Moilanen et al. 2009). While the Southern Regional Offset Guidelines and the Kingborough Offset Policy both require an offset to be secured prior to the loss occurring, where the offset involves restoration, revegetation or payment of a financial contribution to be used to secure equivalent values in the future, there is a time lag and a high risk of the promised offset outcomes not being achieved (Allchin, Kirkpatrick & Kriwoken 2013; Gibbons & Lindenmayer 2007; Maron et al. 2012). There is a positive relationship between certainty and direct protection on or off-site under a Part 5 Agreement or as a new bushland reserve (chi^2 = 189, df = 1, p < 0.001).

In recognition of the uncertainty and time delays associated with restoration and revegetation, the Kingborough Offset Policy precludes these offset mechanisms being used in isolation and provides for increased replacement ratios. While the high level of risk and uncertainty associated with financial contributions makes them less desirable than direct protection and management, financial contributions are an important offset mechanism for small losses which are otherwise impractical to offset. As a result of this offset mechanism, $938,308 has been collected by Kingborough Council since 2003 and is now being strategically invested in biodiversity conservation outcomes within the LGA in accordance with the endorsed expenditure guidelines. These guidelines ensure the funds are expended on outcomes consistent with the offset policy and the requirements of the permit conditions imposed at the time of the loss. In the absence of this offset mechanism, small losses would continue to occur with no gain (section 7.1.4).

Security

Security is a cornerstone of offsets, which must aim to be permanent (Southern Tasmanian Councils Authority 2013). The requirement for permanent protection of offset sites is embedded in the Kingborough Offset Policy, with Clause 5.7 requiring 'recipient land' to become 'secure conservation land'. 'Secure conservation land' means land that is effectively and permanently managed for conservation under a conservation covenant under the *Nature Conservation Act 2002* (NCA), an agreement under Part 5 of LUPAA or transferred to public ownership. While protection under any of these mechanisms constitutes secure conservation land, the protection mechanisms are not equal. Conservation covenants are generally considered to be the most secure mechanism for protecting an offset in a new reserve. However a planning authority cannot require a conservation covenant as a condition of a planning permit, leaving Part 5 Agreements as the only legal mechanism a planning authority can impose as a condition of a planning permit (section 7.1.4). Transferral to Council as a bushland reserve may be seen as more secure than a Part 5 Agreements as ownership is by a public authority. However, a key limitation of transferral as a bushland reserve is the lack of legal mechanism on the title to ensure the bushland reserve is maintained as an offset in perpetuity. While a Part 5 Agreement is registered on the title and under the terms of the Agreement is in effect in perpetuity, it is not meaningful for a planning authority to enter into a Part 5 Agreement with itself.

There also remain concerns around the efficacy of Part 5 Agreements as an appropriate legal mechanism for achieving biodiversity conservation outcomes in perpetuity. Part 5 Agreements established to maintain and protect biodiversity values in perpetuity within a specified conservation zone and registered on the title are similar in intent and status to a conservation covenant established under the NCA (section 7.1.4). However, they only require the consent of the land owner and the Council to revoke or alter the Agreement. There are also concerns with the enforceability of Part 5

Agreements, which are seen as being uncertain and costly (Southern Tasmanian Councils Authority 2013). Under s65A of LUPAA, the enforcement provisions in LUPAA only apply to infringement offences and there is nothing in LUPAA which makes non-compliance with a Part 5 Agreement an offence (pers. comm. Don Armstrong, 19 May 2015). Enforcement of a Part 5 Agreement is therefore either through the Supreme Court, where orders can be made for specific performance of an agreement by requiring the person to do something or refrain from doing something, or via imposing a condition in the permit that the person acting on the permit must comply with the terms of the agreement once executed (pers. comm. Don Armstrong, 19 May 2015). The security of Part 5 Agreements is also undermined by a lack of compliance and monitoring of protected areas (Gibbons & Lindenmayer 2007). Therefore, while protection under a Part 5 Agreement meets the definition of secure conservation land under the Offset Policy, the security and effectiveness of Part 5 Agreements are open to question.

Table 8.2 Extent of loss (hectares) according to regulation in effect at the time (one-way analysis of variance with Tukey HSD test). Raw values with the same letter are statistically identical at p > 0.005. Bold indicates highest value for the variable.

	Pre KPS 2000	KPS 2000 + FPA	KPS 2000 no FPA	KPS 2000 post van Beelan	KPS 2000 post Schedule 10	KIPS 2015	F	P-value
Extent loss (UGA)	**15.27a**	1.086b	0.0253b	0.158b	1.162b	0.259b	$10.5_{5/78}$	<0.001
Extent loss (LGA)	**3.53a**	0.725b	0.056b	0.166b	0.979b	0.168b	$5.00_{5/187}$	<0.001
Extent loss TNVC (UGA)	**5.570a**	0.874b	0.02353b	0.1580b	0.534b	0.149b	$5.45_{5/78}$	<0.001
Extent loss TNVC (LGA)	**1.59a**	0.587ab	0.042b	0.149a	0.456ab	0.102b	$5.11_{5/187}$	<0.001
Extent loss DOV (UGA)	**5.570a**	0.239b	<0.001 b	<0.001 b	0.037b	0.028b	$23.75_{5/78}$	<0.001
Extent loss DAS (LGA)	0.400a	0. 350a	0.006a	**0.863a**	0.415a	0.052a	$2.37_{5/187}$	0.041
Extent loss swift parrot foraging (UGA)	**5.570a**	0.239b	<0.001 b	0.111b	0.064	0.028b	$22.16_{5/78}$	<0.001
Extent loss swift parrot foraging (LGA)	**1.11a**	0.200b	0.015b	0.119b	0.064b	0.076b	$4.1_{5/187}4$	0.001
Extent loss *E. viminalis* (LGA)	0.00ab	0.457b	0.1579b	0.042b	**5.33a**	0.419b	$3.41_{5/187}$	0.006

Source: Audit of biodiversity loss, gain and risk within the UGA from 2000-2018; and, audit of loss and gains subject to offsets from 2000-2018; both conducted in 2018 as part of this research. Data derived from: Council records of development applications; satellite imagery; and, Resource Management and Conservation (2006a).

Table 8.3 Percentage of proposals involving loss of individual tree loss or areas of habitat according to regulation in effect at the time (chi^2). Bold indicates highest value for the variable.

	Attribute	Pre KPS 2000	KPS 2000 + FPA	KPS 2000 no FPA	KPS 2000 post van Beelan	KPS 2000 post Schedule 10	KIPS 2015	*Chi*^{2}	*df*	*p* value
Biodiversity loss (% of proposals)	Individual trees (UGA)	0	60	80	55.6	85	**94.7**	12.7	5	0.027
	Individual trees (LGA)	20	65.7	79.5	48	**87**	67.7	14	5	0.016
	Threatened species habitat (UGA) (individual trees, habitat)	0, 6.3	17.3, **43.8**	15.4, 6.3	7.7, 6.3	26.9, 25	**32.7**, 12.5	21.3	10	0.019
	Threatened species habitat (LGA) (individual trees, habitat)	0.9, 4.4	17, 20	24.1, 4.4	10.7, 13.3	13.4, 13.3	**33.9, 44.4**	22	10	0.015

Source: Audit of biodiversity loss, gain and risk within the UGA from 2000-2018; and, audit of loss and gains subject to offsets from 2000-2018; both conducted in 2018 as part of this research. Data derived from: Council records of development applications; satellite imagery; and, Resource Management and Conservation (2006a).

Table 8.4 Percentage of proposals involving offsets according to regulation in effect at the time (chi²). Bold indicates highest value for the variable.

	Attribute	Pre KPS 2000	KPS 2000 + FPA	KPS 2000 no FPA	KPS 2000 post van Beelan	KPS 2000 post Schedule 10	KIPS 2015	*Chi²*	*df*	*p* value
Offset (y/n) (% of proposals)	Offset (hectares, individual trees only) (UGA)	3	**100**	**100**	60	**100** (67, 33)	**100**	62.1	10	<0.001
Offset mechanisms (% of proposals)	Bushland reserves (UGA)	0	0	0	0	**66.7**	33.3	34	5	<0.001
	Bushland reserves (LGA)	0	0	0	0	**66.7**	33.3	17.6	5	0.004
	In –situ Part 5 Agreement (UGA)	0	**60**	0	0	20	20	16.6	5	0.005
Offset Principles (% of proposals)	Avoidance (UGA)	0	25	10	55.6	50.0	**68.4**	13.8	5	0.017
	Avoidance (LGA)	60	48.6	56.4	76	47.8	**85.5**	20.5	5	0.001
	Additionality (UGA)	0	90	**100**	**100**	**100**	**100**	29.7	5	<0.001
	Additionality (LGA)	80	94.3	**100**	**100**	**100**	**100**	17.1	5	0.005
	Like for like (equivalent, partially equivalent) (UGA)	0	95, 5	**100, 0**	90.9, 0	100, 0	**100,0**	43.5	10	<0.001
	Like for like (equivalent, partially equivalent) (LGA)	80, 0	85.7, **8.6**	97.4, 2.6	96, 0	**100**, 0	96.8, 3.2	18.3	10	<0.001

Source: Audit of biodiversity loss, gain and risk within the UGA from 2000-2018; and, audit of loss and gains subject to offsets from 2000-2018; both conducted in 2018 as part of this research. Data derived from: Council records of development applications; satellite imagery; and, Resource Management and Conservation (2006a).

8.5 Evaluation of Part 5 Agreements

Part 5 Agreements have been utilised by Kingborough Council for the protection of biodiversity values as part of the development approval process since 2004. Kingborough Council is currently a party to 74 Part 5 Agreements with the explicit intent of establishing conservation zones and protecting biodiversity values. These Agreements may be considered to result in an additional private reserve estate in Kingborough of approximately 555.85 hectares. This additional area secured under Part 5 Agreements, referred to as the Part 5 Reserve Estate, represents an increase of 24% to the 2300 hectares protected under the NCA within Kingborough.

Of these Agreements, 73 (or 99%) were established as a result of the development approval process, with 57% the result of offset requirements and 43% the result of zone requirements. One further Part 5 Agreement was entered into voluntarily. Over 50% of all Part 5 Agreements established to protect biodiversity values were triggered by subdivision, establishing more than 439 hectares (or 79%) of Kingborough's Part 5 Reserve Estate. Single dwellings are also an important driver of the establishment of Part 5 Agreements, with 34% of Agreements established as the result of development applications for a single dwelling. However, the mean extent of the conservation area established as a result of single dwellings (2.1 hectares) is less than for subdivision (M = 11.6 hectares). There is a significant relationship between conservation areas established as an offset and development type ($chi^2 = 18$, $df = 4$, $p < 0.001$) with 68% ($n = 26$) of conservation areas the result of subdivision not related to offsets. Conversely, 84% ($n = 21$) of conservations areas resulting from single dwellings and all of conservations areas resulting from other development types were offset requirements.

Over 80% of all Part 5 Agreements establishing conservation areas were located in an Environmental type zone, with the balance in the rural and residential zones. There was a significant relationship between the extent of conservation areas established as an offset and zoning ($chi^2 = 7.7$, $df = 3$, $p = 0.05$) with 47% ($n = 28$) of conservation areas in the environmental type zones and 60% ($n = 3$) of conservation areas in rural not related to offsets. In contrast, all conservation areas within the residential type zones ($n = 9$) were the result of offsets. There was also a significant relationship between the size of the conservation area established under a Part 5 Agreement and whether the conservation area was established as an offset ($F = 8.091_{1/72}$, $p = 0.006$). Those conservation areas established as an offset are significantly smaller in extent (M = 3.8 hectares) relative to those established as a result of zone provisions (M = 12.7 hectares). These differences partially reflect the subdivision provisions for environmental zones within KPS 2000 and KIPS 2015, which require the establishment of Part 5 Agreements to protect and manage all remaining environmental values outside the area required for a future single dwelling and associated bushfire hazard management. As properties within the environmental zones are often larger and contain extensive values, the size of the conservation areas established under these provisions is large.

While Kingborough Council routinely uses Part 5 Agreements as a mechanism for establishing conservation zones and protecting biodiversity values, and in so doing has increased the extent of the private reserve estate, compliance and ecological monitoring are critical to determine the effectiveness and appropriateness of these Agreements as a legal and practical mechanism for achieving long-term biodiversity outcomes. To address this knowledge gap, field based compliance and ecological monitoring were undertaken across 32% (177 hectares) of the Part 5 Agreement Reserve Estate (section 2.1.3 and Appendix VIII).

8.5.1 Compliance audit

Using the multi-point scale developed by Brown et al. (2013a) (Table 2.2), over 70% (n = 13) of properties monitored showed a significant effort in meeting the overall terms of the Agreement but fell short of complying with all the terms (Figure 8.10). The level of satisfactory compliance with all the terms of the Agreement was just 20% (n = 4). However, there were no instances of total non-compliance and only one Agreement showed a high level of non-compliance. The level of compliance with the common terms of Agreements was even higher, at almost 90% (n = 16), reflecting the fact that, with the exception of two Agreements, all Agreements monitored complied with the common terms of the Agreement, such as vegetation removal, placement of fill, taking of wildlife and encroachment into the conservation zone. Therefore, the low level of overall satisfactory compliance predominantly relates to varying levels of non-compliance with the specific terms of the Agreement, including weed management, fencing, stock access, reporting requirements and registration on the title, rather than the common general terms of Agreements.

A key driver of low level of satisfactory compliance with all terms is non-compliance with reporting requirements, with 55% (n = 10) of Agreements including specific requirements in relation to reporting and 70% (n = 7) not complying with these reporting requirements (Figure 8.10). Consistent with the findings in (Brown et al. 2013a), the requirement for a bond had a significant positive correlation with compliance (chi^2 = 11.3, df = 12, p = 0.04). Bonds act as a form of insurance or guarantee on actions required as a condition of approval (Brown et al. 2013a; Preston 2016). Where a bond based on the costs of implementing and monitoring the Part 5 Agreements was required as a condition of the planning permit, reporting was routine. This was essentially because reporting was directly linked to release of the bond payments in increments and there was therefore a financial incentive to comply with reporting requirements. Where bonds were not required, there was no incentive to report and also no trigger within Council to check whether or not reporting is being undertaken. Bonds are therefore important tools for ensuring adequate reporting on compliance with Part 5 Agreements and implementation of management actions.

Of the 10% (n = 2) of Agreements which did not comply with all of the common terms, one breached the Agreement through the placement of large amounts of fill in the conservation zone. Compliance action was taken at the time, the fill was subsequently removed, a rehabilitation plan implemented, ongoing reporting is being undertaken and the condition of the site is improving. The other Agreement not complying with the common terms showed evidence of encroachment into the conservation zone and the total area of the intact vegetation remaining in the zone was less than specified in the Agreement by 250 m^2. This site represents the smallest of all the conservation zones (900 m^2) and is located in a residential context. While weed management is lacking, the remaining area of the zone is not being encroached upon and the landholder appears to be acting in good faith in retaining the vegetation and conservation values to the best of their abilities. The apparent breach is therefore more indicative of the challenges of managing such a small and isolated conservation zone in a residential setting by people with limited skills in vegetation and weed management rather than any intentional disregard for the Agreement. This situation reflects the importance of ensuring the size of the conservation zone is realistic and able to be achieved within the scope of the approved development. Unintentional breaches of agreements also highlight the importance of providing ongoing extension and support to landholders' party to Part 5 Agreements for conservation.

Weed management, fencing issues and stock access also emerged as recurring compliance issues (Figure 8.10). In relation to weed management, there was little evidence of effective weed management for 17% (n = 3) of Agreements, with weed infestations more extensive than reported at the time the Agreement came into effect. In some instances the weed infestations are becoming substantial and the scale of the issue appears larger than acknowledged in the Agreement. This was particularly the case where the Agreement was required as a condition of a permit for a single or ancillary dwelling, where there was a level of non-compliance in all cases. This high proportion of non-compliance could be partially explained by either the extent of weed infestations being under reported and/or the expectations of weed management being improbable. These weed management requirements place a high additional burden on landholders at a time when their focus is on building their home, potentially creating unrealistic expectations for implementing Part 5 Agreement. Additional landholder support or collaborative weed management on adjacent properties is needed.

The situation is somewhat different where the requirement for the Part 5 Agreement relates to larger scale developments with significant financial gains for the developer. In these instances high expectations for weed management are more reasonable and also more important, as it ensures primary weed control is undertaken prior to development of any lots. Where bonds were required on larger subdivisions, weed management prescriptions were satisfactorily implemented, whereas where a bond was not required, there was a medium-high level of non-compliance for weed management in 36% (n = 4) of cases.

Fencing was inadequate in 44% (n = 8) of Agreements and in all but one instance this was the result of a branch falling on the fencing resulting in a short stretch where the fence was down. In the one instance where a fallen branch was not responsible for the fencing issue, an entire stretch of fence was down, reflecting poor fencing construction. In two of the instances where the fencing was down, there was the potential for stock access to the conservation zone, however there was no evidence they were doing so. In one instance, there was evidence that stock had been accessing a large area of a conservation zone which only required fencing in the event that stock were to be run on that part of the property. Given stock access was evident, the matter was raised with the landowner and fencing is now in place.

While a Part 5 Agreement is still binding on the parties once signed and sealed, the Agreement does not have the effect of running with the title and explicitly binding all future owners unless it is also registered on the title. Registering the Agreement on the title is therefore critical to achieving the intent of the Agreement, which is to establish the conservation zones in perpetuity. Registering the Agreement on the title is also generally a condition of the planning permit requiring the Part 5 Agreement. Of the Agreements monitored, 10% (n = 2) were not registered on the title and one of these was also a Private Timber Reserve (PTR). The lack of registration of the Part 5 Agreement on a property also subject to a PTR has the potential to undermine the intent and purpose of the Part 5 as there is no trigger beyond Council’s internal register to flag the co-existence of these two Agreements and ensure the PTR does not result in the clearance and conversion of the Part 5 conservation area.

The compliance monitoring also found that, where required under the Agreement (n = 3), rehabilitation prescriptions are being satisfactorily implemented. Threatened species management prescriptions are also generally being complied with where required in so far as the population of threatened flora itself appears to be stable. However, it was not evident that the landholders have undertaken the required surveying or reporting.

8.5.2 Ecological monitoring

The compliance audit shows the level of compliance with the terms of Agreements was moderate. However, this audit says nothing about the values protected or how they are tracking. The results of the ecological monitoring of 177 hectares (32%) of the Part 5 Agreement Reserve Estate indicate that the key values captured by these Agreements were threatened native vegetation communities (72 hectares), foraging habitat for the swift parrot (107 hectares) and hollow dwelling habitat (120 hectares) (Figure 8.11). The results also indicate that over 95% (n = 17) of sites monitored had one or more of these significant ecological values present.

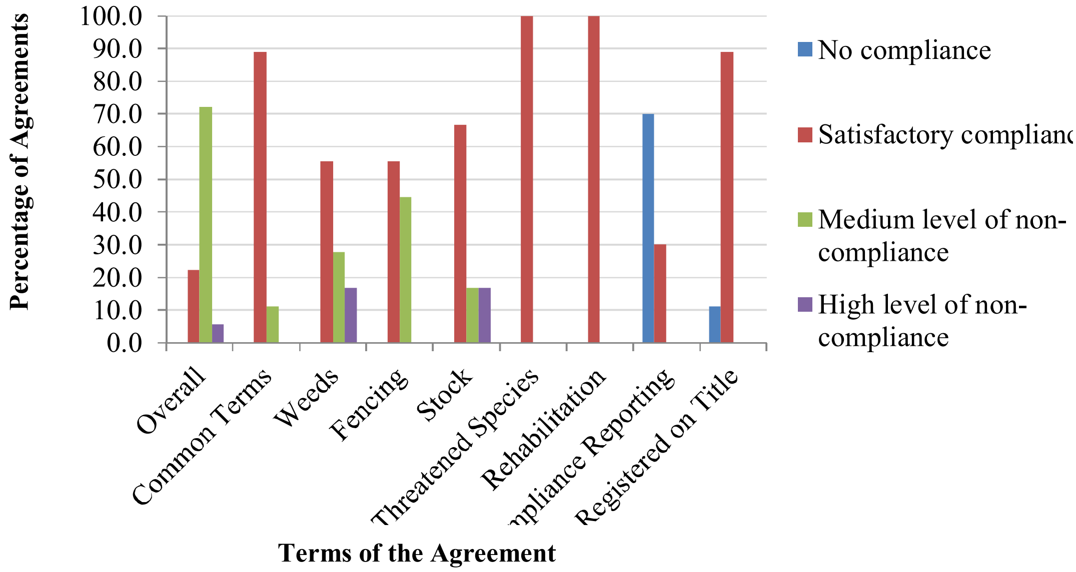


Figure 8.10 Scales of compliance with Part 5 Agreements for conservation

Source: Audit of areas protected through the development approval process from 2000-2018, conducted in 2018 as part of this research. Data derived from: Council records of development applications and the results of field based compliance and ecological monitoring. Compliance scale based on Brown et al. (2013a).

Given that hollow dwelling habitat in particular is a very limited resource in Kingborough and takes a very long time to form, the inclusion of over 100 hectares of predominantly medium density hollow dwelling habitat within the 177 hectares of the Part 5 Reserve Estate monitored was an important outcome. Also captured within the portion of the Part 5 Reserve Estate monitored was a small area (~17 hectares) of forty-spotted pardalote habitat on Bruny Island. The limited extent of forty-spotted pardalote habitat within the Part 5 Reserve Estate reflects the limited extent of colonies across the broader landscape. The areas monitored also included very small areas of Chaostola skipper habitat and threatened flora populations (*Epacris vrigata* spp. Kettering), however these areas were too small to incorporate into the figures. While the extent of forty-spotted pardalote and Chaostola skipper habitat were small, their importance should not be dismissed given the endangered status of these species and the limited availability of their habitat.

When significant ecological values are considered in terms of their condition, the results indicate that there was no significant relationship between the presence of these values and the overall condition of the vegetation. There was also no significant relationship between the presence of these values and specific measures of condition including canopy health, vegetation structure, vegetation health, understorey diversity and weed cover. These results suggest that these values are present and persist irrespective of the condition of the vegetation. These results also suggest that Part 5 Agreements are useful instruments for retaining and protecting significant ecological values even where the condition of a patch may be poor.

Notwithstanding, there was a significant relationship between presence of a value and a specific measure of condition: the Chaostola skipper and landscape context (*chi*^{2} = 2.8, *df* = 7, *p* = 0.002). Landscape context refers to those external or non-specific factors that influence the condition of the zone, such as its size and position in the vegetated landscape (Michaels 2006). Based on the analysis, Chaostola skipper habitat is present in patches where the landscape context is poor. In particular, Chaostola skipper habitat is present in patches where the amount and configuration of native vegetation within proximity to the site is low and the site is remote from large remnants. In other words, Chaostola skipper habitat is present in more fragmented and urbanised landscapes. This does not necessarily mean that Chaostola skipper habitat is not present in more intact landscapes. Rather it suggests that Chaostola skipper habitat can continue to persist in more fragmented patches in urban landscapes and retention of such patches is therefore worthwhile.

The results of the ecological monitoring also show 12 different native vegetation communities were captured by the Agreements, of which 5 are listed as threatened (Figure 8.11). Of these, the most extensive was *Eucalyptus globulus* dry forest and woodland (DGL) (57.43 hectares) and the lowest represented were *Eucalyptus viminalis* grassy forest and woodland (DVG) (1.05 hectares) and *Eucalyptus tenuiramis* forest and woodland on sediments (DTO) (1.28 hectares). The results also indicate that more than 80% of the sites monitored had condition scores of greater than 70 and only 10% of assessment zones had scores less than 50, indicating that the vegetation is in good condition (Figure 8.11). However, condition varied between and within some vegetation communities, with both *Eucalyptus ovata* forest and woodland (DOV) and *Eucalyptus amygdalina* forest and woodland on sandstone (DAS) having scores ranging from <50 up to >80 (Figure 8.12). In contrast *Eucalyptus obliqua* forest with broad-leaf shrubs (WOB), *Eucalyptus globulus* wet forest (WGL) and dry *Eucalyptus pulchella* forest (DPU) consistently had condition scores of >70 and *Eucalyptus amygdalina* coastal forest and woodland (DAC) generally had lower condition scores ranging from 59-69 (Figure 8.12).

There was a significant difference in condition for threatened native vegetation communities compared to non-threatened vegetation communities ($F = 5.011_{1/40}$, $p = 0.031$), with threatened vegetation communities generally being in poorer condition with a mean VCA score of 65, when compared with non-threatened communities, with a mean VCA score of 73. Further analysis of the data indicated that this difference was driven by differences in landscape context ($F = 6.39_{1/40}$, $p = 0.016$), suggesting that threatened vegetation communities were often smaller and more isolated. However, despite the poorer landscape context of the threatened vegetation communities, these results also indicate that the site condition attributes of health, structure and composition of these communities were not significantly different to those of non-threatened communities. As such, it cannot be assumed that poorer landscape context will necessarily result in poorer site condition. It also cannot be assumed that the retention and protection of smaller and more isolated areas of threatened vegetation is not worthwhile on the grounds that the values will degrade due to their poorer landscape context. Notwithstanding, the overall size of the conservation zone, as distinct from the area and landscape context of an individual vegetation community within a conservation zone, is an important consideration.

When the condition data were examined by Part 5 Agreement rather than vegetation community, it is evident that vegetation condition was relatively consistent across some Part 5 Agreements sites, with little variation between the minimum, maximum and average, whereas others had considerable variation (Figure 8.13). At sites 6 and 7, the minimum, maximum and average were all equal as only one assessment was undertaken at these sites due to their small size. When condition was considered in relation to the size of the conservation zone established by the Part 5 Agreement, it is evident that the average vegetation condition was generally poorer in conservation zones <=1 hectare in size (Figure 8.14). However, there was little variation in average condition scores for conservation zones > 1 hectare (Figure 8.14).

Further statistical analysis indicates that there was a statistically significant relationship between patch size and site condition score ($F = 3.48_{2/40}$, $p = 0.041$,) and also between site condition and the overall landscape context of the site ($F = 3.17_{7/40}$, $p = 0.011$,). These differences suggest that it was not just the size of the conservation zone that was important, but the context of the zone, including the size of the vegetation patch the conservation zone sits within, the extent of native vegetation in the broader landscape and the distance of the conservation zone from a core area of native vegetation (> 50 ha). These results do not necessarily mean that Part 5 Agreements should not be used for small isolated sites (< 1ha), as there may be good justification for the conservation of these areas, for example, the protection of specific threatened flora species with relatively small disjunct populations, such as the blackhood sun-orchid (Department of Environment 2015), or to provide connectivity across the landscape for species with limited dispersal mechanisms such as the Chaostola skipper (Threatened Species Section 2012a). However, these results do further support the recommendation that the use of Part 5 Agreements for small isolated sites (< 1ha) be reviewed. To inform this review, further analysis of minimum thresholds for retention of isolated patches and the persistence of significant values in small areas is required. Where it is determined that a Part 5 Agreement is not an appropriate mechanism, the viability of retaining these areas in the landscape needs to be considered and any loss of values offset.

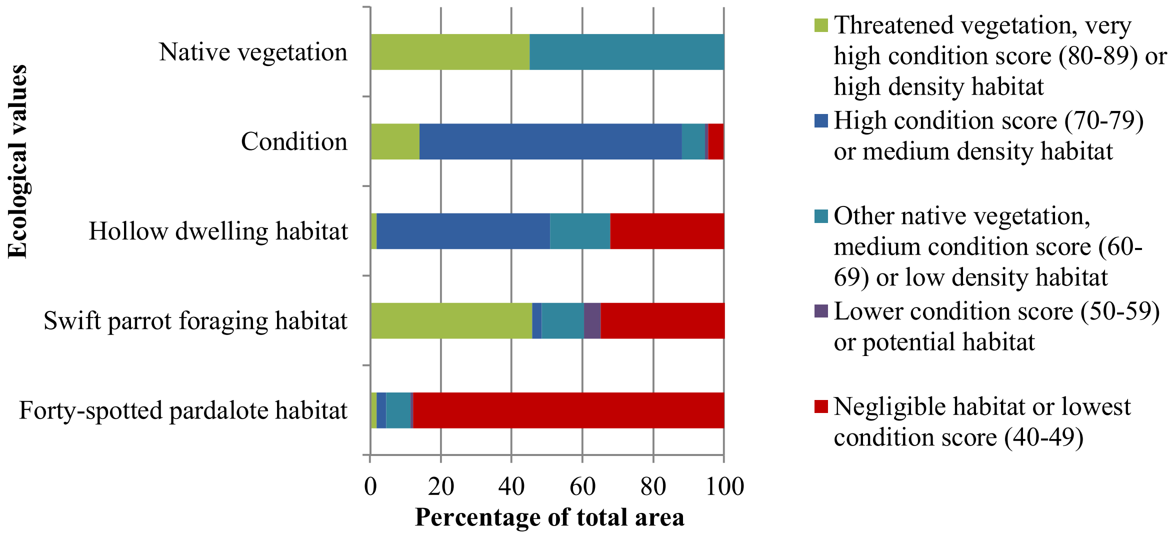
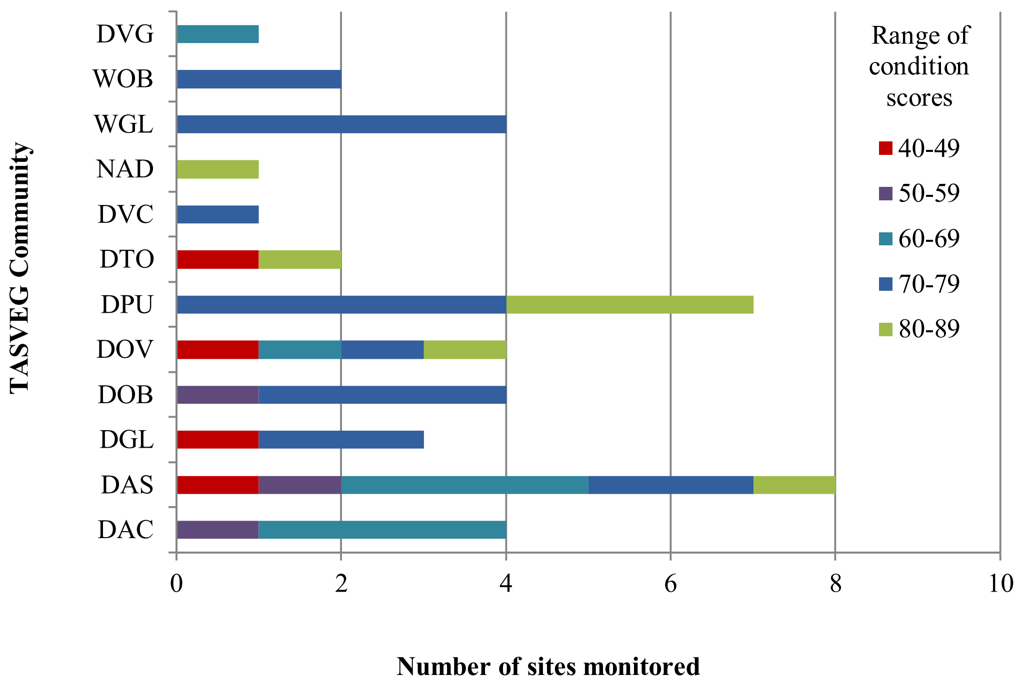


Figure 8.11 Summary of values across the monitored Part 5 Reserve Estate



DAC – *Eucalyptus amygdalina* coastal forest and woodland; DAS – *Eucalyptus amygdalina* forest and woodland on sandstone; DGL – *Eucalyptus globulus* dry forest and woodland; DOB – *Eucalyptus obliqua* dry forest; DOV – *Eucalyptus ovata* forest and woodland; DPU – *Eucalyptus pulchella* dry forest; DTO – *Eucalyptus tenuiramis* on sediments; DVC – *Eucalyptus viminalis-Eucalyptus globulus* coastal forest and woodland; DVG – *Eucalyptus viminalis* grassy forest and woodland; NAD – *Acacia dealbata* forest; WGL – Eucalyptus globulus wet forest; WOB – *Eucalyptus obliqua* with broad-leaf shrubs.

Figure 8.12 Summary of condition scores by vegetation community across the Part 5 Reserve Estate (higher score = higher condition)

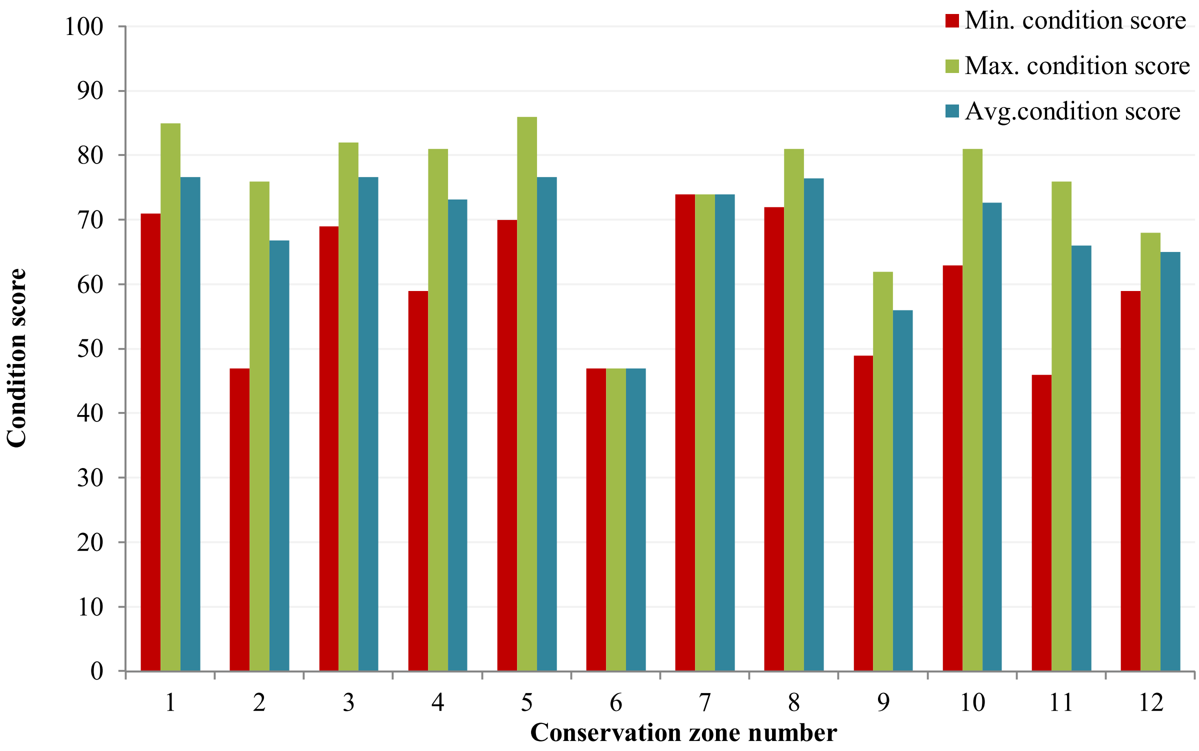


Figure 8.13 Summary of condition scores by conservation zone across the Part 5 Reserve Estate

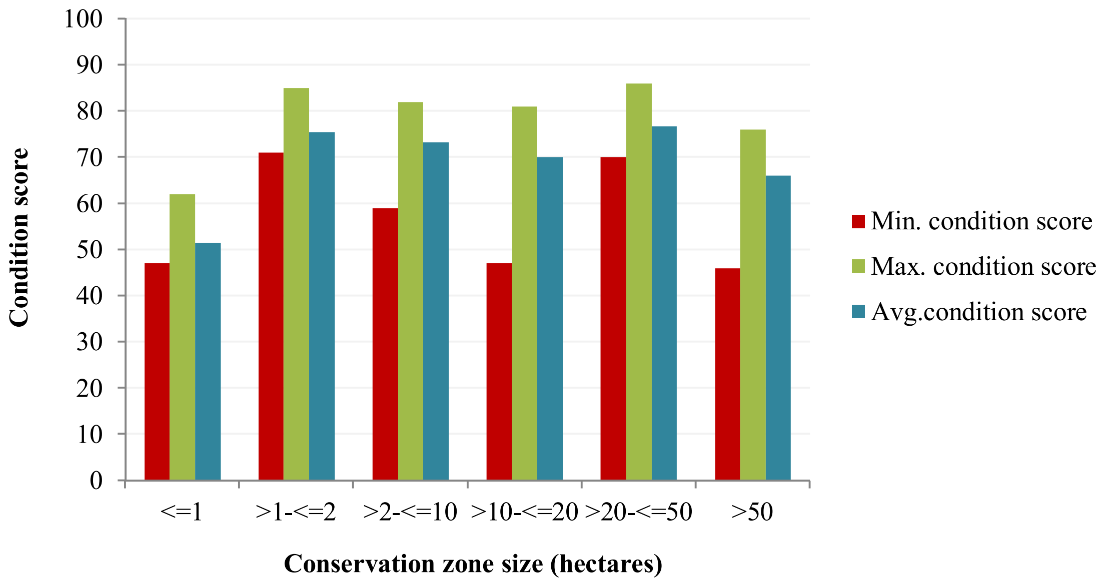


Figure 8.14 Summary of condition scores by size of conservation zone across the Part 5 Reserve Estate

Source of Figures 8.11 - 8.14: Audit of areas protected through the development approval process from 2000-2018, conducted in 2018 as part of this research. Data derived from: Council records of development applications and the results of field based ecological monitoring.

8.5.3 The effectiveness of the biodiversity conservation measures being implemented via Part 5 Agreements

It is evident from the results of the monitoring that there was a number of compliance issues associated with existing Part 5 Agreements. Some of these issues were administrative, such as reporting and registering Agreements on the title, and do not necessarily have a direct effect on the condition or quality of the values protected by the Agreement. However, they were nonetheless fundamental to the integrity of the Agreements and require addressing. Other issues, including weed management, stock access and fencing, have the potential to directly degrade the values of the conservation zone.

Notwithstanding, while non-compliance was common, no incidents of non-compliance identified as a result of the monitoring represented major breaches of Agreements. Rather, they reflect a general trend of benign neglect and the limited capacity of some landholders to implement the required management prescriptions to the extent expected under the terms of the Agreement. To this extent, most instances of non-compliance may be viewed as minor and able to be resolved with appropriate follow-up and support.

However, it needs to be acknowledged that Part 5 Agreements can be seen as the stick approach to biodiversity conservation, where conservation is imposed on a landowner in exchange for a permit to develop. This imposition can result in land owners feeling negative towards conservation, their conservation zone and towards the Council. Minor non-compliance has the potential to become major non-compliance.

This study represents a once-off snapshot on the effectiveness of Part 5 Agreements. Ongoing monitoring and enforcement is critical ensuring conservation values within Part 5 reserves are not eroded. With the number of Part 5 Agreements doubling since the monitoring was undertaken but the Part 5 Reserve Estate only increasing by 12% (60.85 hectares), the focus has been on growing the Reserve Estate rather than maintaining it. Kuempel (2018:5) found ‘expansion alone, without additional enforcement, can actually reduce conservation outcomes’.

Beyond monitoring enforcement, providing technical extension for landholders with Part 5 Agreements for conservation would improve landholder understanding of the significance and contribution of their conservations zones and provide them with support in managing these areas proactively. Technical extension could be as simple as establishing a network for these landholders and connecting them with current research, field days and grant opportunities.

8.6 Offsets and Part 5 Agreements under the SPPs

While the SPPs provide for offsets, offsets under the SPPs will be limited to ‘having regard to’ any on-site biodiversity offsets (Tasmanian Government 2018). No provision is made for ex-situ offsets or indirect offsets and no criteria are provided on what constitutes a suitable offset (section 7.2.4). Similarly, unlike KPS 2000 and KIPS 2015, the SPPs also do not make specific provision for Part 5 Agreements, beyond the potential use of Part 5 Agreements to achieve any on-site offsets. Furthermore, many of the developments for which offsets have been secured in Kingborough historically will potentially be exempt from consideration let alone offsets due to the zoning or type of development. For example, the Hawthorn Drive subdivision would not have been assessed against biodiversity provisions if the SPPs were in effect, as code application relies upon a statutory map and the statutory map is predominantly reliant on TASVEG, which mapped this site as exotic vegetation. Similarly impacts on biodiversity at Kingston Green would be beyond consideration as the site is zoned Inner Residential.

Even where a development located within an urban-type zone is subject to the biodiversity provisions in the SPPs, these provisions can be readily circumvented via unit development rather than subdivision or by seeking to develop the entire site, thereby precluding on-site offsets. Consequently, under the SPPs all remaining native vegetation within urban-type zones is at risk of loss with no conservation gain. Even where vegetation is within a less intensive zone, within the UGA of Kingston/Blackmans Bay, this vegetation remains vulnerable to loss as a result of rezoning or other development.

In total, 123 hectares of native vegetation will be at risk or vulnerable to loss within the Kingston/Blackmans Bay UGA under the SPPs (Figure 8.15). Across the LGA 396 hectares of mapped priority vegetation would be exempt within urban-type zones and therefore at risk of loss without any consideration. While individually these losses may be small, as the results of the offset and Part 5 evaluations have demonstrated, small losses can have a big impact and offsetting small losses can achieve worthwhile gains. In addition, more than 9,000 hectares of mapped priority vegetation would be exempt from the Natural Assets Code (NAC) across the rural landscape were State agricultural mapping applied strictly in accordance with the guidelines (section 5.2.3). As proposals such as Cambria illustrate (section 5.2.3), the potential extent of loss is worthy of consideration and assessment in the least.

The SPPs therefore represent a big step backwards for biodiversity conservation in Kingborough. The only mechanisms available to planning authorities to provide consideration for biodiversity and offsets beyond that provided in the SPPs is via Specific Area Plans (SAPs) or Site Specific Qualifications (SSQs). These mechanisms both have the ability to provide for local variation from the SPPS, but are limited in their application to individual sites or locations and are not capable of addressing the deficiencies in the SPPs.

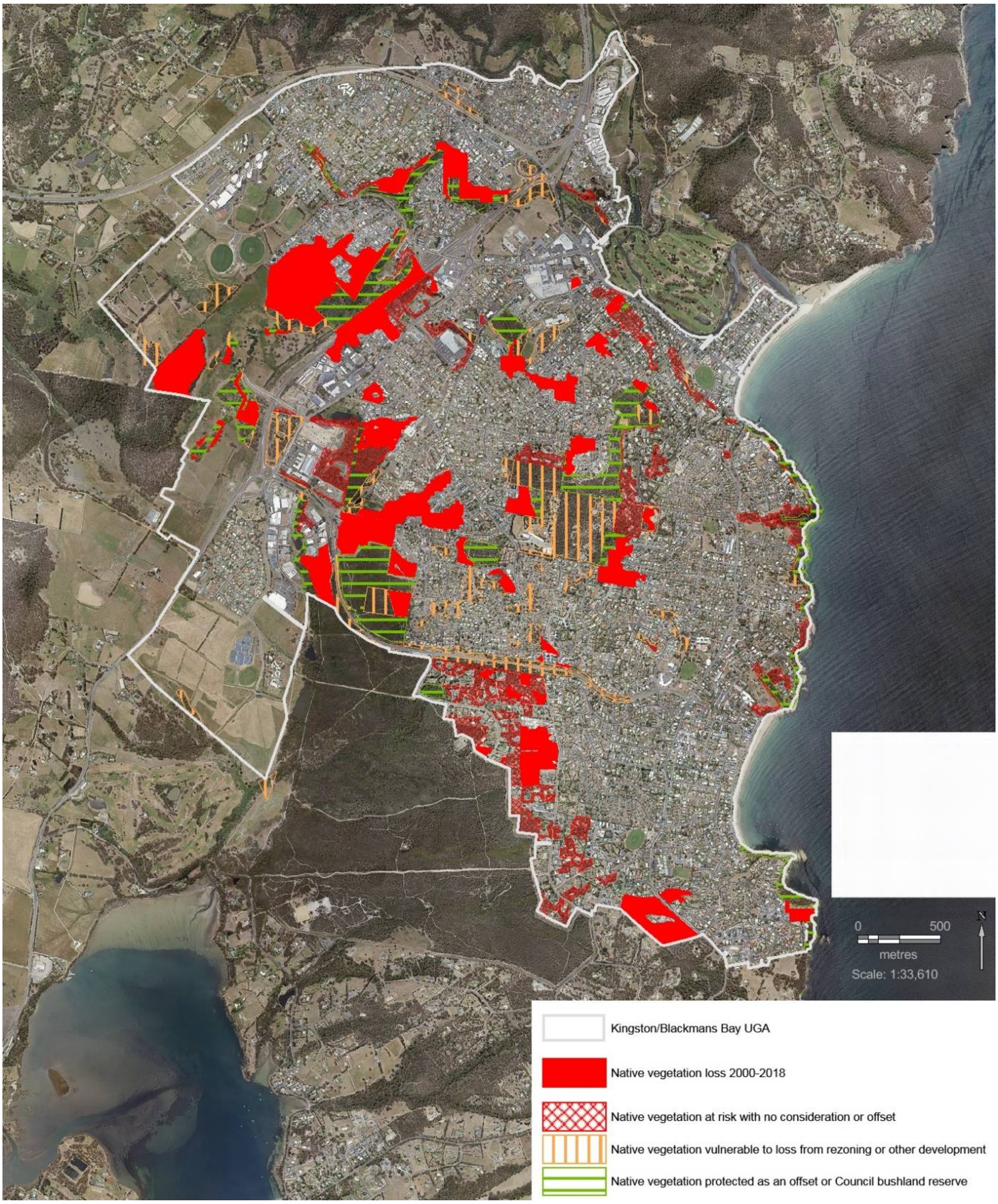


Figure 8.15 Native vegetation loss, native vegetation gain and native vegetation at risk in the Kingston/Blackmans Bay Urban Growth Area (UGA)

Source: Audit of biodiversity loss and biodiversity gains conducted in 2018 as part of this research. Data derived from: Council records of development applications; satellite imagery; and, Resource Management and Conservation (2006a).

8.7 Conclusion

The Kingborough case study demonstrates that biodiversity conservation at the scale of local land use planning, as part of the development application process is appropriate and necessary, especially in the urban residential zones, which are experiencing the highest proportion of loss. The Kingborough case study also challenges the position that:

> once it's the suburbs, it's gone. Natural values will be extinguished. Whether it's through vegetation removal, initial development, subsequent development, redevelopment, domestic cats and dogs, whatever (Statutory Planner 1 2015).

While there is a heavy reliance on averted loss offsets and financial contributions within Kingborough, both of which are criticised in the literature (section 5.2.3), for areas of biodiversity within urban-type zones, a case can be made that these areas are at risk in the absence of an averted loss offset. In rural landscapes, where development pressures are less and zoning provides a level of protection for values, it is more difficult to sustain an argument that an averted loss offset achieves the required gains. However, protecting values in rural landscapes as offsets still provides security on the title and establishes management requirements. At the scale of local government, where the capacity to implement complex offset requirements is limited, ratio-based approaches using averted loss offsets have the potential to result in better biodiversity conservation outcomes than not providing for offsets. These findings are consistent with Brownlie and Botha (2009), who found that a ratio-based approach using averted loss offsets has merit. The results of the case study demonstrate that under historic and proposed planning regulations, the alternative to an averted loss offset is not retention, but loss without outcomes. Offsets, when applied within the context of the mitigation hierarchy and designed and implemented properly, can be a valuable mechanism to reduce biodiversity loss (Preston 2016).

The Kingborough case study also demonstrated the potential of Part 5 Agreements in securing biodiversity conservation outcomes. While there were a number of instances of minor non-compliance, when the results of the monitoring of compliance with the terms of the Agreement and management prescriptions were considered in conjunction with the results of the ecological monitoring it was also evident that generally the condition of the conservation zones is relatively good. This suggests that overall the Part 5 Agreements are fit for their intended purpose and achieving their intended aims of maintaining and conserving the identified biodiversity values. This was particularly the case where demonstrating and reporting on conservation outcomes was linked to payment of bonds, as the landholders have a financial incentive to implement the management actions in the Agreement. However, there is the need for improved reserve design and ongoing investment in monitoring and compliance.

The Kingborough case study illustrates that biodiversity conservation outcomes are capable of being achieved by the performance criteria under pre-interim and interim planning schemes (Chapter 8). This case study also illustrates the importance of statutory planning instruments, as the last defence, in securing biodiversity outcomes.

In the next and final chapter of this thesis, I: (i) distil the core elements of effective integration of biodiversity conservation into land use planning identified through this research in relation to the different stages of land use planning; (ii) evaluate current land use planning processes, provisions and practices in relation to these attributes; and, (iii) identify interventions or reform to improve substantive integration of biodiversity conservation into land use planning in Tasmania.

Chapter 9 - Synthesis: An evaluation of effective integration of biodiversity conservation into land use planning

Effective biodiversity conservation relies upon the integration of biodiversity into local land use planning and development control frameworks (Chapter 1). Furthermore, the extent to which land use planning furthers biodiversity conservation is a direct function of how biodiversity is integrated into policy, strategic planning and statutory planning instruments, and how these instruments are implemented. The statewide case study (chapters 3-7) established the role of land use planning in biodiversity conservation in Tasmania, verifying the pivotal function of statutory planning instruments in particular. The statewide case study also demonstrated that the integration of biodiversity conservation into land use planning, both between regulators and between planning schemes, is inconsistent, contested and in a state of flux. Irrespective of substantive requirements to promote biodiversity conservation in parent legislation, the *Land Use Planning and Approvals Act 1993* (LUPAA), the substantive integration of biodiversity conservation breaks down between and within all stages of the land use planning process. Findings from the Kingborough case study (Chapter 8) demonstrated that local planning schemes, as the last line of defence, can and do make an important contribution to biodiversity conservation. The Kingborough case study also demonstrated that biodiversity conservation can be achieved in urban contexts, and validated the need for and importance of planning controls to protect biodiversity on the fringe. Despite the potential for some interim planning schemes to provide for substantive biodiversity outcomes, current planning reforms threaten to erode this contribution, as a result of extensive exclusions, weakened performance criteria and restrictions on local variation.

In the final chapter of this thesis, I: (i) distil the core elements/attributes for effective integration of biodiversity conservation into land use planning identified through this research in relation to the different stages of land use planning; (ii) evaluate current land use planning processes, provisions and practices in relation to these attributes, identifying where these process, provisions and practices break down; and, (iii) identify interventions or reform to improve substantive integration of biodiversity conservation into land use planning in Tasmania.

9.1 Regulatory and policy framework

An integrated and coordinated biodiversity policy framework is an essential component of ecologically sustainable development (ESD) and biodiversity conservation. A consistent biodiversity policy framework across regulators is currently lacking and land use planning in particular is operating in a policy vacuum (Chapter 3). Consequently, integration of biodiversity conservation into land use planning is inconsistent across regulators and between planning authorities, the role of regulators is unclear and contested and there are no agreed objectives, surrogates or indicators (Chapter 3 and Chapter 4) (Table 9.1).

Where biodiversity governance is dispersed among government and non-government actors, as it is in Tasmania, successful biodiversity policy implementation requires clearly defined and mutually understood objectives and roles and responsibilities (Clement, Moore & Lockwood 2015:94). Successful biodiversity policy also needs to identify surrogates and indicators for biodiversity which are scale and value specific (section 4.3). To establish consistent policy settings and ensure integration and coordination across regulators, an integrated policy framework for biodiversity and native vegetation is necessary. This policy framework needs to: (i) establish agreed biodiversity conservation objectives and outcomes; (ii) identify scale and value specific surrogates and indicators for biodiversity; (iii) identify the roles and responsibilities of the different regulators; (iv) validate the role of land use planning in biodiversity conservation; and, (v) require reporting on loss and gain by all regulators for all biodiversity surrogates, not just to the Forest Practices Authority (FPA) for forest communities (Table 9.1).

To be given effect, this policy framework needs to link to the Resource Management and Planning System (RMPS) and LUPAA, preferably as a State Policy under the *State Policies and Projects Act 1993* (section 3.2.2). This policy framework also needs to integrate with or replace the Permanent Native Forest Estate (PNFE) Policy (section 3.2.2) In addition to the lack of an integrated policy framework, there also remains no coherent regulatory framework for biodiversity conservation in Tasmania which establishes roles and responsibilities identified in the Policy and how they interact (section 3.2) (Table 9.1).

Introducing formal referral requirements when impacts reach specified trigger levels or thresholds for impacts on threatened species listed under the *Threatened Species Protection Act 1995* (TSPA), communities listed under the *Nature Conservation Act 2002* (NCA) or matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) would ensure an integrated decision-making process (section 3.2.3 and 6.3.2) (Table 9.1). This approach would establish planning authorities and planning schemes as a gatekeeper for State and Commonwealth legislation. Each regulator could still be responsible for undertaking their own assessments against their relevant provisions or requirements. However, the process would be streamlined and, if provided for, could facilitate collaboration and coordination between regulators thereby reducing duplication. A potential model exists in New South Wales under State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017, which establishes acceptable thresholds for assessment of vegetation clearing by different regulators.

In Tasmania, a formal referral mechanism with associated thresholds could be established by amending LUPAA in a manner similar to Level 2 Activities, where a planning authority is required to refer an application for development to the Environment Protection Authority (EPA) Board where it meets the definitions and thresholds specified in Schedule 2 of *Environmental Management and Pollution Control Act 1993* (EMPCA) (section 3.2.1). The referral process would be further supported by the development of endorsed definitions, guidelines and management prescriptions (sections 4.3, 6.2, 6.3 and 6.4). Amendments to parent legislation may also be required.

Collaboration and coordination could also be achieved via a memorandum of understanding, which is legally binding where it satisfies all elements of a contract, a public authority management agreement (PAMA) under s31 of the TSPA or other legal mechanism. A PAMA in particular is worthy of further investigation as it is already provided for in legislation. However, a PAMA remains untested and is limited in application to the management of threatened species or potentially threatening processes [s31(1)]. Similarly, declaration of critical habitats and associated interim protection orders under the TSPA could improve integration between regulations. Under s39 of the TSPA, where there is a conflict between an interim protection order for critical habitat and a planning scheme, the order prevails over the planning scheme. Consequently, a planning authority must consider potential impacts on a critical habitat when determining whether to approve an application for development under LUPAA (Allchin 2010). Declaration of critical habitats would also establish a stronger level of statutory protection for areas identified as critical for threatened species. However, as with PAMAs, this mechanism is limited to threatened species and therefore is not a substitute for introducing referral requirements (section 4.1.1).

9.2 Strategic planning

Systematic strategic planning based on science is central to preventing further loss of biodiversity, particularly in urbanising areas (Gordon et al. 2009; Ives et al. 2010). However, in the absence of a consistent policy framework establishing agreed biodiversity conservation objectives and outcomes, strategic planning in Tasmania is currently operating in a vacuum (section 3.2.2). Furthermore, the available decision-support tools are not fit-for-purpose and current mechanisms available at the strategic planning stage are limited in their ability to secure conservation outcomes, particularly where the strategic decision involves rezoning to a zone exempt from the NAC (section 5.2.4). As a consequence of the policy vacuum, inadequate decision-support tools and limited mechanisms for securing conservation outcomes at the strategic stage, substantive integration of biodiversity conservation at the strategic planning stage is compromised (section 5.2.4) (Table 9.1).

The deficiencies at the strategic stage of the land use planning process could be partially resolved via the development of a State Policy under the *State Policies and Projects Act 1993*, and therefore implemented via the RMPS and planning schemes (section 5.2.4). A State Policy for biodiversity conservation should: (i) operationalise biodiversity conservation objectives and outcomes established in legislation: (ii) identify biodiversity surrogates and areas important for biodiversity conservation; (iii) establish minimum thresholds and limits for identified surrogates and areas; and, (iv) provide mechanisms to achieve biodiversity conservation outcomes at the strategic planning stage (Table 9.1).

The State Policy on the Protection of Agricultural Land 2009 provides a potential model (section 5.2.4). This Policy links to the strategic planning stage and limits development to where it is subservient to and required as part of an agricultural use. As State Policies are confined to matters of State significance, to provide for implementation of local biodiversity policies and facilitate innovation, the NAC should also be amended to: (i) enable consideration of biodiversity at the development application stage where not appropriate or feasible to resolve at the strategic planning stage; and, (ii) provide for additional local biodiversity provisions where supported by local policy and strategy document (Table 9.1).

9.3 Code application

Code application is a prerequisite for consideration and assessment of the impacts of a proposal on biodiversity. Effective code application relies upon the following attributes: (i) explicit identification, classification and definition of concepts of biodiversity; (ii) textual application of the code based on field verification; and, (iii) code application being zone and activity neutral.

Explicit identification, classification and definition of concepts of biodiversity are central to establishing whether biodiversity is a relevant matter for consideration and ensuring decisions contribute to biodiversity conservation outcomes (chapter 4) (Ives et al. 2010; Wallace 2012). Under interim schemes, concepts of biodiversity and terminology were highly variable and there was an absence of definitions (section 4.1). Identification of biodiversity in objectives also did not translate to consideration of biodiversity in decision-making processes, with planning scheme provisions limited to specified concepts, and code application disproportionately focussed on threatened native vegetation communities (section 5.1.1).

The SPPs partially address the limitations of the interim schemes by delivering consistency in concepts of biodiversity and addressing gaps with threatened species, threatened species habitat and native vegetation broadly. However, the SPPs do not enable consideration of biodiversity in urban-type zones or for some development types (section 5.2.3). Furthermore, operational definitions of biodiversity surrogates specific to local land use planning remain lacking (section 4.3).

To address the deficiencies in the SPPs, endorsed agreed definitions of biodiversity surrogates are required (Table 9.1). Once developed, the NAC requires amendment to incorporate the endorsed definitions. To enable these definitions to evolve as knowledge improves, LUPAA should also be amended to allow amendment of incorporated documents without requiring a subsequent amendment to the planning scheme (Table 9.1). To ensure biodiversity is not beyond consideration, the NAC should also be amended to enable consideration of biodiversity in urban-type zones, including individual trees, for all development types regulated by LUPAA (Table 9.1).

The method and extent of code application is also critical to effective integration (Chapter 5). Reliance on a statutory map (sections 5.2.2), limitations on field verification (6.1.3) and extensive exemptions and exclusions (section 5.2) all contribute to perverse outcomes for biodiversity and potentially also developers. To address the deficiencies of the SPPs, the NAC should be amended to provide for textual application of the code outside the statutory map (section 5.2.2) (Table 9.1). The simplest way to achieve this would be to amend the definition of the priority vegetation area in Clause C7.3 to include land containing priority vegetation. To remove the extensive exemptions and exclusions under the SPPs, the NAC should also be amended to enable a priority vegetation area to be located within any zone, unless it can be demonstrated that biodiversity conservation outcomes have already been achieved as a result of an earlier assessment process (section 5.3) (Table 9.1).

9.4 Planning scheme ordinance

Planning scheme ordinance is the mechanism to translate objectives into outcomes at the development approval stage of land use planning. The heavy lifting for biodiversity conservation outcomes through the land use planning process is predominantly via the planning scheme ordinance, rather than at the strategic stage. The reliance on the development approval process to achieve biodiversity conservation outcomes is problematic, as often by the time a proposal has reached this stage, the outcome is assumed irrespective of the impact (section 5.2.4).

Reliance on ordinance can be reduced and biodiversity conservation outcomes enhanced through improvements to strategic planning processes and plans (section 5.2.4). However, there is always pressure to rezone and, even in areas with the highest protection via zoning (Environmental Management Zone), pressure to develop is increasing, particularly in response to the State Government's promotion of development in protected areas. Consequently, the wording and scope of ordinance is fundamental to effective biodiversity conservation. Drafting planning scheme ordinance is complex and legalistic and the intent of this thesis is not to specify what the ordinance should be. Rather it is to identify what the ordinance needs to include and achieve.

Central to effective ordinance are the standards and provisions, or tests, used to determine whether loss is acceptable or not and in what circumstances (section 7.1). To achieve effective biodiversity conservation outcomes, these tests need to: (i) be satisfied substantively not just procedurally; (ii) establish all stages of the mitigation hierarchy; (iii) achieve biodiversity conservation outcomes; and, (iv) be explicit and discoverable whilst still being adaptive to changing knowledge and new information (Chapter 7).

Requiring the performance criteria to be satisfied substantively not just procedurally is a key element of effective integration (sections 1.2 and 7.3). 68% (n = 19) of interim schemes include a substantive requirement to satisfy the performance criteria, with the remaining 32% (n = 9) only providing for procedural consideration (section 7.3). The establishment of the mitigation hierarchy varies significantly between interim schemes (Table 7.1), with some schemes failing to include any biodiversity standards (Central Highlands and Derwent Valley Council), others incorporating all stages of the mitigation hierarchy and requiring demonstrated conservation outcomes (Kingborough) and the majority of schemes, including the SPPs, focussing disproportionately on the minimise stage of the mitigation hierarchy, with the avoid stage largely absent and conservation outcomes limited to having regard to any mitigation measures and on-site offsets (section 7.2 and Table 9.1).

While the introduction of the SPPs will see integration of biodiversity into the development approval processes across all LGAs, and consistency in performance criteria, the priority vegetation provisions in the NAC are widely acknowledged as being unworkable and urgently requiring review (Tasmanian Planning Commission 2016a). Identified deficiencies in the performance criteria of the NAC include: (i) limiting the assessment against the performance criteria to procedural consideration rather than a substantive requirement to satisfy them (section 7.3); (ii) weak code objectives and standards developed in a policy vacuum (section 3.3.3 and 7.4); (iii) a disproportionate focus on the minimise and mitigate stages of the mitigation hierarchy, with no defensible criteria for determining when loss is unacceptable (section 7.2); (iv) limiting conservation outcomes to having regard to any mitigation measures and on-site offsets (section 7.2); (v) broad and uncertain performance criteria which are open to interpretation and not supported by agreed policies, procedures or processes (section 6.2 and 6.4); and, (vi) no ability for additional local standards, compromising biodiversity conservation outcomes and limiting innovation (sections 3.3.3 and 7.3) (Table 9.1). These deficiencies create legal uncertainty, increase costs and foster a protracted assessment and decision-making processes, without furthering biodiversity conservation: green tape without green outcomes.

A comprehensive review of the NAC, including the performance criteria, is needed. While other reforms may be identified as part of a review, to address the deficiencies in the NAC identified as part of this research the provisions should be amended to require demonstration that the performance criteria are satisfied not just considered. The provisions should also be amended to incorporate explicit performance criteria which: (i) operationalise the legislative, policy and strategic objectives and requirements; (ii) give effect to agreed management prescriptions and decision-making procedures; (iii) establish when loss is unacceptable, including irreplaceability criteria; (iv) require demonstrated conservation outcomes where loss is unavoidable; (v) provide for a range of offset mechanisms, including off-site and financial; and, (vi) enable local variation and innovation where there is a demonstrated need (Table 9.1).

9.5 Implementation

The implementation stage of the land use planning process involves the translation of performance criteria to on-ground outcomes via interpretation and application of the ordinance, conditions of approval and fit-for-purpose offset and protection mechanisms. Reliable, consistent and ecologically sound interpretation and application of performance criteria relies upon field verified data, endorsed decision-support tools and formalised decision-making processes and procedures which are fit-for-purpose and provide for third party validation (section 6.4). Interpretation and application of performance criteria under interim schemes is inconsistent, over-reliant on desk-top data and the advice of an expert engaged by the applicant. Field verification is provided for under interim schemes but not always required, with an over-reliance on desk-top data which is unreliable at the site-specific scale. Under the SPPs, the ability to require field verification is unclear (section 6.1) and endorsed management prescriptions, decision-making procedures and fit-for-purpose decision-support tools specific to land use planning are also lacking (section 6.2) (Table 9.1). Consequently, even where field verification is undertaken, interpretation of performance criteria is generally reliant on the advice of an expert engaged by applicant (section 6.3).

Development and adoption of agreed definitions, guidelines and management prescriptions specific to land use planning, and which are able to evolve as scientific knowledge changes, would improve the consistency and reliability of interpretation (Table 9.1). By linking these tools to satisfaction of the performance criteria, they are given effect and gain in strength. The agreed procedures and associated management prescriptions and decision-support tools developed by the Forest Practices System (FPS) and their linkage to the Forest Practices Code provide a potential model, subject to review and adaptation for use in a land use planning context (section 6.4). Given the reliance on field verification by a suitably qualified person engaged by the applicant, and the inherent conflict of interest this relationship creates, development of an accreditation system and introduction of formal referral processes would also ensure greater consistency in interpretation and application of performance criteria and improve outcomes for biodiversity conservation (section 6.3) (Table 9.1).

Conditions of approval are also central to implementation as they give effect to the outcome of the decision-making process by establishing the terms which must be satisfied for a development to proceed. To be valid, a condition of approval must be fairly and reasonably related to the ordinance and to be effective, permit conditions must also be time-bound, specific and enforceable (section 3.3.2). Conditions of approval relating to biodiversity are routinely included in planning permits (section 3.3.2). However, each planning authority has discretion to draft conditions, which are only subject to review in the event that a planning permit is appealed (section 3.3.2) (Table 9.1). Development of template standard conditions of approval would improve the consistency, certainty and validity of permit conditions (Table 9.1). Lack of monitoring, compliance and enforcement of permit conditions also undermines their effectiveness (section 3.3.2). Incorporation of bond requirements is also effective for improving compliance with permit conditions (section 8.5) (Table 9.1). The experience of the FPS also suggests the accreditation system, including training, facilitates effective implementation and reduces the need for compliance and enforcement (section 6.3) (Table 9.1).

The security and effectiveness of the protection mechanisms by which biodiversity conservation outcomes are managed and secured into the future are pivotal to the translation of performance criteria and conditions of approval into long-term on-ground outcomes. Protections mechanisms for offsets or other biodiversity conservation outcomes available within land use planning include transferral of land into public ownership or Part 5 Agreements. Part 5 Agreements are a useful instrument for formalising protection of biodiversity through the development approval process and can make a worthwhile contribution to the private reserve estate (section 8.5). Offsets also make an important contribution to biodiversity conservation, particularly for small losses within urban residential zones where the impacts are unavoidable and the development will proceed regardless (section 8.4).

To avoid time lags between losses and gains and ensure equivalence, offsets and protection mechanisms need to be established prior to impacts occurring (section 8.4). Enforceability and security are also cornerstones of effective implementation (section 8.5) and require protection mechanisms to secure outcomes in perpetuity and provide for ongoing adaptive management and monitoring (section 8.4). Given the extent of loss arising from land use planning decisions is often small (section 8.2), protection mechanisms which enable the cumulative impact of small losses to be combined into larger coordinated gains are essential.

Consistent offsetting and protection as part of the development application process is currently limited to one LGA (section 7.2.4 and Chapter 8). While offsets are provided for under the interim schemes, implementation is currently ad hoc and limited, partly as a result of the lack of a coordinated offset program (section 7.2.4). Concerns with the effectiveness of Part 5 Agreements as a protection mechanism also limit their use (section 7.2.4). Under SPPs, offset requirements and options will be reduced and the need to demonstrate biodiversity conservation outcomes revoked (sections 7.2 and 7.3) (Table 9.1). Therefore, while the SPPs will require consistent procedural application of performance criteria, there is no requirement or ability to translate these performance criteria into on-ground outcomes (section 7.3 and section 8.6). Amending the NAC to require demonstration that performance criteria are satisfied, not just considered, would establish the requirement for substantive biodiversity conservation outcomes (Table 9.1). As part of a broader review of the NAC, the performance criteria also require amendment to give effect to State, regional and local offset policies and frameworks. To facilitate innovation and enable individual Councils to implement local offset policies, the SPPs should be amended to provide a mechanism for additional local schedules establishing stronger biodiversity provisions (section 7.3) (Table 9.1).

At the State level, a much needed reform is the development and implementation of a coordinated approach to offsetting, which: (i) provides a consistent policy framework for offsets in Tasmania; (ii) establishes best practice offset principles, rules, procedures and mechanisms; (iii) requires ongoing management and monitoring of protected areas; (iv) establishes a coordinated offset scheme enabling small losses to achieve larger gains and facilitating less-resourced Councils to contribute to a larger offset program; and, (v) enables individual Councils to implement local offset policies, including establishing and maintaining a Part 5 Reserve Estate and offset fund, where this is consistent with and necessary to implement Council policy (Table 9.1). However, in designing a Statewide framework for offsets, consideration needs to be given to ensuring the requirements and outcomes of a Statewide framework are consistent with and as stringent as offsets that could be achieved via implementation of local offset policies, as the coexistence of alternative offset options with different requirements can undermine outcomes (Dupont 2017). To improve the effectiveness of the available protection mechanisms, the following recommendations could be implemented: (i) develop suitability criteria for contributions to the Part 5 Reserve Estate to target conservation gains (Table 9.1). Ecological criteria should be consistent across LGAs. However, as the Council is party to the agreement and takes on responsibility for ensuring compliance, each LGA should have the discretion to include additional criteria specific to their requirements; (ii) establish and implement an ongoing monitoring and compliance program for Part 5 Agreements (Table 9.1). The audit process adopted by the FPS may provide a useful framework and the monitoring and compliance methods utilised in this research could provide the starting point for a methodology; and, (iii) provide technical extension for landholders with Part 5 Agreements for conservation to improve landholder understanding of the significance and contribution of their conservation zones and provide them with support in managing these areas proactively (section 8.5.3) (Table 9.1).

Clearly there are resourcing implications of integrating biodiversity conservation into land use planning and implementing the recommended interventions. One of the aims of current planning reform is to reduce costs for developers. While a user-pays model may have potential to meet some costs, such an approach is unlikely to gain traction as a solution. If the cost of effective integration of biodiversity is not to be borne by applicants, then the cost must be borne by government. Currently this burden largely falls on local government, and the capacity of individual local governments is variable (sections 3.3.2 and 6.1.3). However, many of the recommendations to improve integration of biodiversity and achieve substantive biodiversity conservation outcomes rely on the State government developing policy, amending legislation, establishing State-based accreditation and offset programs, developing decision-support tools and providing expert advice; all of which rely upon adequate resourcing and political will. In the absence of a user-pays system, potential resourcing options include the introduction of a biodiversity levy or increasing rates, both of which place the burden onto the community as a whole.

9.6 Further research

This research provided a comprehensive appraisal of the effectiveness of land use planning in achieving biodiversity conservation outcomes, across multiple scales (statewide, regional, local and site-specific), throughout the life cycle of the land use planning process (from legislation, to objectives, to policy, to strategy, to ordinance to outcomes). Without amendment to planning provisions and legislation, as well as increased resourcing and fit-for-purpose decision support tools, the move towards a consistent statewide approach will simultaneously result in an increase in procedural consideration of biodiversity and the disintegration of substantive biodiversity conservation outcomes.

Given the important contribution of planning schemes to biodiversity conservation, further research is needed on the drafting of robust planning scheme ordinance and permit conditions which provide legal certainty whilst also facilitating adaptive management and substantive outcomes. There are also gaps in knowledge on: retention thresholds for different biodiversity surrogates within urban and peri-urban environments, including patch size, configuration, condition, composition and structure; and, species and values specific management prescriptions for biodiversity within a development context rather than a forestry or agricultural context. While the audit of the Part 5 Reserve Estate provided an important and useful snapshot of the effectiveness of biodiversity protection through conditions of approval, ongoing research is also required to determine the effectiveness of land use planning in achieving biodiversity conservation outcomes over time and in a changing climate.

Table 9.1 Key elements and interventions for effective biodiversity conservation

<table>
<tr><td rowspan="6">Regulatory & policy framework</td><td colspan="2">Element 1: Integrated and coordinated biodiversity policy framework</td></tr>
<tr><td>Gaps</td><td>Recommended interventions</td></tr>
<tr><td>• Inconsistent policy framework across regulators.
• Roles of regulators unclear and contested.
• No agreed objectives, surrogates or indicators.</td><td>• Establish a consistent policy framework across regulators for biodiversity and native vegetation which:
– establishes agreed biodiversity conservation objectives and outcomes;
– identifies scale and value specific surrogates and indicators for biodiversity;
– identifies the roles and responsibilities of the different regulators;
– validates the role of land use planning in biodiversity conservation; and,
– requires reporting on loss and gain by all regulators for all biodiversity surrogates, not just the FPA for forest communities.</td></tr>
<tr><td colspan="2">Element 2: Integrated regulatory framework for biodiversity conservation</td></tr>
<tr><td>Gaps</td><td>Recommended interventions</td></tr>
<tr><td>• No coherent legislative framework.
• No integration between legislation or regulations.
• No formal referral requirements or processes.</td><td>• Amend legislation to:
– establish role and responsibilities of regulators and how they interact;
– establish the authority for implementation of the Policy via land use planning legislation and associated processes and,
– introduce formal referral requirements where a proposal impacts upon State and/or Commonwealth listed biodiversity
• Activate the critical habitat, interim protection order and public authority management provisions in the TSPA.</td></tr>
<tr><td rowspan="2">Strategic planning</td><td colspan="2">Element 3: Effective strategic planning processes which achieve substantive outcomes</td></tr>
<tr><td>• No agreed biodiversity conservation objectives and outcomes.
• No mechanisms to achieve practical biodiversity conservation outcomes at the strategic planning stage.
• No ability for local variation or innovation.</td><td>• Develop a State policy for biodiversity which:
– operationalises biodiversity conservation objectives and outcomes established in legislation:
– identifies biodiversity surrogates and areas important for biodiversity conservation;
– establishes thresholds and limits for identified surrogates and areas; and,
– provides mechanisms to achieve biodiversity conservation outcomes at the strategic planning stage.
• Amend the NAC to:
– enable consideration of biodiversity at the development application stage where not appropriate or feasible to resolve at the strategic planning stage; and,
– provide for local biodiversity provisions where supported by local policy and strategy document.</td></tr>
</table>

Code application	**Element 4: Explicit identification, classification and definition of concepts of biodiversity subject to the Code**	
	• Gaps in concepts of biodiversity remain - no consideration of individual trees or biodiversity in urban-type zones. • Lack clear definitions or guidelines for identifying and classifying.	• Develop endorsed agreed definitions specific to local land use planning. • Amend LUPAA to enable amendment of incorporated documents without requiring amendment to the planning scheme. • Amend the NAC to: – incorporate the endorsed definitions; – enable consideration of biodiversity, including individual trees, in all zones; and, – provide for additional local biodiversity provisions where supported by local policy and strategy document.
	Element 5: Textual application based on field verification	
	• Application limited to a statutory map. • Requirement for field verification unclear.	• Amend the NAC to provide for textual application of the code outside the statutory map.
	Element 5: Zone and activity neutral	
	• Extensive exclusions and exemptions creating a significant gap addressing the impacts of some development types,.	• Amend NAC to enable a priority vegetation area to be located within any zone and the standards to apply to any development regulated by the planning scheme, where there is work for the code to do.
Planning scheme ordinance	**Element 6: Substantive, scientifically robust performance criteria which establish minimum standards and thresholds**	
	• No substantive requirement to satisfy the performance criteria. • No consistent legislative or policy framework to guide performance criteria. • Partial adoption of the mitigation hierarchy. • Conservation outcomes limited having regard to mitigation measures and on-site offsets. • Performance criteria broad and open to interpretation. • No agreed decision-support tools.	• Amend the performance criteria in the NAC to: – require demonstration that performance criteria are satisfied not just considered; – operationalise the legislative, policy and strategic objectives and requirements; – establish the mitigation hierarchy, with avoidance as the first stage and offsets as a last resort; – establish when loss is unacceptable, including irreplaceability criteria; – require demonstrated conservation outcomes where loss is unavoidable, including secure protection prior to impacts occurring, ongoing adaptive management and monitoring; – give effect to agreed management prescriptions, decision-making procedures and decision-support tools; – give effect to best practice offset principles, rules, procedures and mechanisms, including off-site and financial; and, – enable local variation and innovation where supported by local policy and strategy.

Implementation	**Element 7: Reliable, consistent and ecologically sound interpretation of performance criteria**	
	• Requirement for field verification unclear. • No agreed management prescriptions, decision-making procedures or fit-for-purpose decision-support tools; • Reliance on advice of expert engaged by applicant with no formal mechanism for third party validation; • Endorsed management prescriptions, decision-making procedures and fit-for-purpose decision-support tools specific to land use planning are lacking.	• Develop agreed values-specific management prescriptions, decision-making procedures and decision-support tools which are fit-for-purpose. • Amend the NAC to: – give effect to these management prescriptions, decision-making procedures and decision-support tools; and, – provide for field–based assessments by a suitably qualified persons if considered necessary to determine compliance with performance criteria. • Amend LUPAA to: – enable amendment of management prescriptions, decision-making procedures and decision-support tools without requiring amendment to the planning scheme; – introduce formal referral requirements where a proposal impacts upon State and/or Commonwealth listed biodiversity; – develop and implement a statewide accreditation and advisory system for suitably qualified ecological consultants and species experts; and, – establish a mechanism for the direct engagement of consultants by the regulator or arbiter.
	Element 8: Enforceable, time bound, specific conditions of approval which fairly and reasonably relate to the ordinance	
	• No minimum standards, up to each planning authority with no standard conditions. • Lack of monitoring, compliance and enforcement.	• Develop a standardised template of conditions of approval; • Incorporate bond requirements for implementation and monitoring into permit conditions; and, • Introduce a training and accreditation system for suitably qualified persons and regulators.
	Element 9: Fit-for-purpose offset and protection mechanisms	
	• Offsets and protection will be reduced under SPPs. • Implementation constrained by the lack of a coordinated approach. • Protections mechanisms available but compromised by lack reserve design criteria, need for monitoring an	• Long-term measure - develop and implement a coordinated approach to offsetting, which: – provides a consistent policy framework for offsets in Tasmania; – establishes best practice offset principles, rules, procedures and mechanisms; – requires ongoing adaptive management and monitoring of protected areas; and, – establishes a regional or statewide offset scheme enabling small losses to achieve larger gains and facilitating less-resourced LGAs to contribute to a larger offset program. • Short-term measure – amend LUPPA to enable local variation and innovation for early adopters. • Amend the NAC to: – require demonstration that performance criteria are satisfied not just considered; and, – give effect to State, regional and local offset policies and frameworks; • Develop suitability criteria for the Part 5 Reserve Estate; • Implement a monitoring and compliance program or audits as per FPS; and,

		• Develop a support network for landowners.
	Element 10: Merits based appeal process	
	• Adversarial. • Emphasis on administrative matters and legal interpretation not merit. • Relies upon expert witnesses engaged by applicant.	• Amend LUPAA to provide for: – merits based appeal process; and, – direct engagement of expert witnesses by the regulator or arbiter.
	Element 11: Adequate resourcing	
	• Current levels of capacity and resourcing at local and State levels inadequate. • User-pays politically unpalatable.	• Incorporate bond requirements for implementation and monitoring into permit conditions.

References

Adam, P 2009, 'Ecological communities: the context for biodiversity conservation or a source of confusion?', *Australasian Journal of Natural Resources Law and Policy*, no. 1, p. 7.

Allchin, R 2010, 'Threatened species legislation and the Swift Parrot', Masters thesis, University of Tasmania.

Allchin, R, Kirkpatrick, J & Kriwoken, L 2013, 'On not protecting Tasmanian parrots: the impact of conservation and planning legislation on an endangered species', *Journal of International Wildlife Law and Policy*, vol. 16, no. 1.

Allen, J 1997, 'The role of local government in biodiversity conservation: case study of the City of Burnside', Masters thesis, Mawson Graduate Centre for Environmental Studies, University of Adelaide.

Asikainen, E & Jokinen, A 2009, 'Future natures in the making: implementing biodiversity in suburban land-use planning', *Planning Theory & Practice*, vol. 10, no. 3, pp. 351-368.

Australian Bureau of Statistics 2016, *Population and People, Local Government Area, 2011-2016*, viewed 21/9/2017 2017.

Australian Government 2013a, *Guidelines for nominating and assessing the eligibility for listing of ecological communities as threatened according to the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the EPBC Regulations 2000 (EPBC Regulations)*, Department of Environment, https://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines.

—— 2013b, *Matters of national environmental significance: significant impact guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999*, Department of Environment, http://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance.

bie, ER 2013, *The basics of social research*, Belmont, California: Wadsworth/Cengage Learning, c2014. 6th ed.

Barker, P 2001, *A technical manual for vegetation monitoring*, Resource Management and Conservation, Department of Primary Industries, Water and Environment, Hobart.

Barnes, RW & McCoull, CJ 2002, *A land manager's guide for assessing and monitoring the health of Tasmania's forested bush* Resource Management and Conservation, Department of Primary Industries, Water and Environment, Hobart.

Bates, GM 2013, *Environmental law in Australia*, 8th edn, LexisNexis Butterworths, Chatswood, N.S.W.

Bekessay, S, White, M, Gordon, A, Moilanen, A, McCarthy, M & Wintle, B 2012, 'Transparent planning for biodiversity and development in the urban fringe', *Landscape and Urban Planning*, vol. 108, no. 2-4, pp. 140-149.

Bekessy, SA, Wintle, BA, Lindenmayer, DB, McCarthy, MA, Colyvan, M, Burgman, MA & Possingham, HP 2010, 'The biodiversity bank cannot be a lending bank', *Conservation Letters*, vol. 3, no. 3, pp. 151-158.

Berelson, B 1971, *Content analysis in communication research*, New York: Hafner, 1971 [c1952].

Bezombes, L, Gaucherand, S, Spiegelberger, T, Gouraud, V & Kerbiriou, C 2018, 'A set of organized indicators to conciliate scientific knowledge, offset policies requirements and operational constraints in the context of biodiversity offsets', *Ecological Indicators*, vol. 93, pp. 1244-1252.

Bradshaw, C & Brook, B 2010, 'The conservation biologist's toolbox - principles for the design and analysis of conservation studies', in N Sodhi & P Ehrlich (eds), *Conservation biology for all*, Oxford University Press, United States.

Bragagnolo, C & Geneletti, D 2013, 'Dealing with land use decisions in uncertain contexts: a method to support Strategic Environmental Assessment of spatial plans', *Journal of environmental planning and management*, vol. 57, no. 1, pp. 50-77.

Brown, MA, Clarkson, BD, Barton, BJ & Joshi, C 2013a, 'Ecological compensation: an evaluation of regulatory compliance in New Zealand', *Impact Assessment and Project Appraisal*, vol. 31, no. 1, pp. 34-44.

Brown, MA, Clarkson, BD, Barton, BJ & Joshi, C 2013b, 'Implementing ecological compensation in New Zealand: stakeholder perspectives and a way forward', *Journal of the Royal Society of New Zealand*, vol. 44, no. 1, pp. 34-47.

Brown, MA, Clarkson, BD, Theo Stephens, RT & Barton, BJ 2014, 'Compensating for ecological harm - The state of play in New Zealand', *New Zealand Journal of Ecology*, vol. 38, no. 1, pp. 139-146.

Brownlie, S & Botha, M 2009, 'Biodiversity offsets: adding to the conservation estate, or ‘no net loss’?', *Impact Assessment and Project Appraisal*, vol. 27, no. 3, pp. 227-231.

Brownlie, S, King, N & Treweek, J 2012, 'Biodiversity tradeoffs and offsets in impact assessment and decision making: can we stop the loss?', *Impact Assessment and Project Appraisal*, vol. 31, no. 1, pp. 24-33.

Bryant, S 2010, *Conservation assessment of the endangered forty-spotted pardalote 2009 - 2010*, Department of Primary Industries, Parks, Water and Environment and NRM South, Hobart, Tasmania.

Bull, JW, Hardy, MJ, Moilanen, A & Gordon, A 2015, 'Categories of flexibility in biodiversity offsetting, and their implications for conservation', *Biological Conservation*, vol. 192, pp. 522-532.

Bull, JW, Suttle, KB, Gordon, A, Singh, NJ & Milner-Gulland, EJ 2013, 'Biodiversity offsets in theory and practice', *Oryx*, vol. 47, no. 03, pp. 369-380.

Bull, JW, Suttle, KB, Singh, NJ & Milner-Gulland, EJ 2013, 'Conservation when nothing stands still: moving targets and biodiversity offsets', *Frontiers in Ecology and the Environment*, vol. 11, no. 4, pp. 203-210.

Burgin, S 2008, 'BioBanking: an environmental scientist’s view of the role of biodiversity banking offsets in conservation', *Biodiversity and Conservation*, vol. 17, no. 4, pp. 807-816.

Business and Biodiversity Offset Program 2012a, *Biodiversity offset design handbook - updated*, Business and Biodiversity Program, Washington DC.

—— 2012b, *Resource paper: limits to what can be offset*, Business and Biodiversity Offsets Program, Washington DC.

—— 2012c, *Standards on biodiversity offsets*, Business and Biodiversity Program, Washington DC.

Butler, DW 2009, 'Planning iterative investment for landscape restoration: choice of biodiversity indicator makes a difference', *Biological Conservation*, vol. 142, no. 10, pp. 2202-2216.

Buxton, M, Tieman, G, Bekessy, S, Budge, T, Mercer, D, Coote, M & Morcombe, J 2006, *Change and continuity in peri-urban Australia, state of the peri-urban regions: a review of the literature*, RMIT University, Melbourne.

Calvet, C, Napoléone, C & Salles, J-M 2015, 'The biodiversity offsetting dilemma: between economic rationales and ecological dynamics', *Sustainability*, vol. 7, no. 6, p. 7357.

Carreras Gamarra, MJ, Lassoie, JP & Milder, J 2018, 'Accounting for no net loss: A critical assessment of biodiversity offsetting metrics and methods', *Journal of Environmental Management*, vol. 220, pp. 36-43.

Christensen, M 2007, *Biodiversity offsets - an overview of selected recent developments: New Zealand - where to from here?*, Anderson Lloyd Lawyers, New Zealand.

Clark, PM 1998, 'Tasmania's resource management and planning system: towards sustainable development?', PhD thesis, University of Tasmania.

Clement, S, Moore, SA & Lockwood, M 2015, 'Authority, responsibility and process in Australian biodiversity policy', *Environmental and planning law journal*, vol. 32, no. 2, pp. 93-114.

Commonwealth of Australia 1997, *Nationally agreed criteria for the establishment of a comprehensive, adequate and representative reserve system for forest in Australia: a report by the Joint ANZECC/MCFFA National Policy Statement Implementation Sub-committee*, Commonwealth of Australia, Canberra.

—— 2014, *Inquiry into streamlining of environmental regulation, 'green tape', and one stop shops*, House of Representatives Standing Committee on the Environment, Canberra.

Cowling Richard, M & Wilhelm-Rechmann, A 2013, 'Local land-use planning and the role of conservation: an example analysing opportunities', *South African Journal of Science*, no. 3, p. 1.

Creswell, JW 2013, *Qualitative inquiry and research design: choosing among five approaches*, 3rd edn, Sage Publications, Thousand Oaks, California.

Curran, M, Hellweg, S & Beck, J 2014, 'Is there any empirical support for biodiversity offset policy?', *Ecological Applications*, no. 4, p. 617.

—— 2015, 'The jury is still out on biodiversity offsets: reply to Quétier et al', no. 6, p. 1741, via edsbl (EBSCOhost), https://login.ezproxy.utas.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsbl&AN=RN602894537&site=eds-live.

Dales, JT 2011, 'Death by a thousand cuts: incorporating cumulative effects in Australia's *Environment Protection and Biodiversity Conservation Act*', *Pacific Rim Law and Policy Journal*, vol. 20, no. 1, pp. 149-178.

Denzin, NK & Lincoln, YS (eds) 2011, *The Sage handbook of qualitative research*, 4th edn, Sage Publications, Thousand Oaks, California.

Department of Environment and Primary Industries (Vic) 2013, *Permitted clearing of native vegetation: biodiversity assessment guidelines*, State of Victoria, Melbourne.

—— 2015, *Permitted clearing of native vegetation: biodiversity assessment handbook (v1.0)*, State of Victoria, Melbourne.

Department of Environment Land Water and Planning (Vic) 2015, *Victorian planning provisions*, State of Victoria, Melbourne.

Department of Natural Resources and Environment (Vic) 2002, *Victoria's native vegetation management framework: a framework for action*, State of Victoria, Melbourne.

Department of Primary Industries Parks Water and Environment 2012, *Range boundary mapping*, 23 September, State of Tasmania, Hobart.

—— 2013a, *TASVEG 3.0*, Tasmanian Vegetation Monitoring and Mapping Program, Resource Management and Conservation Division, The LIST.

—— 2013b, *TASVEG 3.0 - metadata statement*, Tasmanian Vegetation Monitoring and Mapping Program, Resource Management and Conservation Division, Hobart, Tasmania.

—— 2014, *Threatened native vegetation communities 2014*, Released May 2015, The LIST.

—— 2015a, *Threatened native vegetation communities 2014 - metadata statement*, Tasmanian Vegetation Monitoring and Mapping Program, Natural and Cultural Heritage Division, Hobart, Tasmania.

—— 2015b, *List of threatened species*, State of Tasmania, viewed 9 September 2016, http://dpipwe.tas.gov.au/conservation/threatened-species/lists-of-threatened-species/full-list-of-threatened-species.

—— 2016b, *Guidelines for establishing offsets for impacts on natural values within the dam assessment framework*, State of Tasmania, Hobart, Tasmania.

Department of Primary Industries Water and Environment 1999, *Recovery plan for Tasmanian native grasslands 2000-2002*, Nature Conservation Branch, Resource Management and Conservation Division, Hobart, Tasmania.

Department of Sustainability and Environment (Vic) 2007, *Native vegetation guide for assessment of referred planning permit applications*, State of Victoria, Melbourne.

Dowling, R 2010, 'Power, subjectivity, and ethics in qualitative research', in I Hay (ed.), *Qualitative research methods in human geography*, Oxford University Press, Don Mill, Ontario, pp. 26-39.

Dupont, V 2017, 'Biodiversity offsets in NSW Australia: the biobanking scheme versus negotiated offsets in urban areas', *Journal of Environmental Law*, vol. 29, no. 1, pp. 75-100.

Dwyer, GJ & Taylor, MP 2013, 'Moving from consideration to application: the uptake of principles of ecologically sustainable development in environmental decision-making in New South Wales', *Environmental and planning law journal*, vol. 30, no. 3, pp. 185-219.

Ecologically Sustainable Development Steering Committee 1992, *National strategy for ecologically sustainable development*, Council of Australian Governments, Canberra.

Eigenraam, W, Barker, P, Brown, M, Knight, R & Whitten, S 2006, *Forest conservation fund conservation value index technical report*, Forest Conservation Fund.

England, P 2005, 'Judicial interpretation of planning schemes under the *Integrated Planning Act 1997 (Qld)*: the more things change ...', *Environmental and planning law journal*, vol. 22, no. 4, pp. 281-295.

Environment Defenders Office (Qld) 2010a, *Ecological sustainability: the purpose of the Sustainable Planning Act 2009*, December 2010.

—— 2010b, *Queensland vegetation protection laws*.

Environment Defenders Office (Vic) 2012, *A framework for action? Implementation and enforcement of Victoria's native vegetation clearing controls*, Environmental Defenders Office (Vic) Ltd, Victoria.

—— 2013, *EDO briefing paper: Victoria's new native vegetation clearing laws*, Environmental Defenders Officer Victoria, Victoria.

Environment Protection Authority 2015, *Guidance for land use planners on Environmental Impact Assessments conducted by the EPA Board*, published on behalf of EPA Tasmania by the EPA Division, Department of Primary Industries, Parks, Water and Environment, Tasmania.

Environmental Consulting Options Tasmania (ECOtas) 2013, *Ecological assessment of proposed residential subdivision at 63 Spring Farm Road ("Spring Farm"), Kingston, Tasmania; for Peter Elderidge*, Hobart, Tasmania.

Environmental Defenders Office (Tas) 2014, *The environmental law handbook: your practical guide to Tasmania's environmental protection and planning laws*, 4th edn, The Office, Hobart.

—— 2015, *State forests, national interests: a review of the Tasmanian RFA*, 4th edn, The Wilderness Society, Hobart.

European Commission 2011, *Our life insurance, our natural capital: an EU biodiversity strategy to 2020*, European Commission, Brussels.

Fallding, M 2004, 'Planning for biodiversity', *Australian Planner*, vol. 41, no. 4, pp. 45-50.

Farrier, D, Kelly, A & Langdon, A 2007, 'Biodiversity offsets and native vegetation clearance in New South Wales: The rural/urban divide in the pursuit of ecologically sustainable development', *Environmental and planning law journal*, vol. 24, no. 6, pp. 427-449.

Farrier, D, Whelan, R & Brown, C 2002, 'Addressing scientific uncertainty in local government decision-making processes', *Environmental and planning law journal*, vol. 19, no. 6, pp. 429-444.

Field, G, Burns, GL & Dale, P 2012, 'Managing vegetation clearing in the South East Queensland urban footprint', *Local Government Law Journal*, vol. 17, no. 4, pp. 215-230.

Flyvberg, B 2011, 'Case study', in NK Denzin & YS Lincoln (eds), *The Sage handbook of qualitative research*, 4th edn, Sage Publications, Thousand Oaks, California, pp. 301-316.

Forest Practices Amendment Regulations, 2009 (S.R. 2009, No. 135).

Forest Practices Authority 2008, *FPA planning guidelines 2008/1*, Forest Practices Authority, Hobart, Tasmania.

—— 2012, *Instruction issued to FPOs on interim guidelines for notifying the FPA of coupes within the potential breeding habitat of the Swift Parrot*, Chief Forest Practices Officer, Hobart.

—— 2014a, *Agreed procedures for the management of threatened species under the forest practices system*, Tasmanian Government, Hobart, Tasmania.

—— 2014b, *Swift parrot breeding habitat*, Fauna Technical Note No. 3, Forest Practices Authority, Hoart, Tasmania.

—— 2015, *Forest Practices Code 2015*, Forest Practices Authority, Hobart, Tasmania.

—— 2017, *FPA Offset Policy 2.0 April 2017*, Forest Practices Authority, Hobart, Tasmania.

Forest Practices Authority & Environment Protection Authority (EPA) Tasmania 2008, *Memorandum of Understanding between the Forest Practices Authority (FPA) and the Environment Protection Authority (EPA) on matters of overlapping jurisdiction*, Tasmanian Government, Hobart, Tasmania.

Forest Practices Authority & Threatened Species Section DPIPWE 2012, *Appendix 1. Summary of threatened fauna species range boundaries and habitat descriptions*, Department of Primary Industries, Parks, Water and Environment Tasmanian Government, Hobart, Tasmania.

Forest Practices Board 2000, *Forest practices code 2000*, Forestry Commision of Tasmania, Hobart, Tasmania.

Forest Practices Board & Department of Primary Industries Parks Water and Environment 2010, *Procedures for the management of threatened species under the forest practices system*, Tasmanian Government, Hobart, Tasmania.

Forest Practices Regulations, 2007.

Gardner, TA, Von Hase, A, Brownlie, S, Ekstrom, JMM, Pilgrim, JD, Savy, CE, Stephens, RTT, Treweek, JO, Ussher, GT, Ward, G & Ten Kate, K 2013, 'Biodiversity offsets and the challenge of achieving no net loss', *Conservation Biology*, vol. 27, no. 6, pp. 1254-1264.

Gibbons, P 2011, *Potential biodiversity offset actions and sites for the Australian Capital Territory*, The Fenner School of Environment and Society, The Australian National University.

Gibbons, P, Evans, MC, Maron, M, Gordon, A, Roux, D, Hase, A, Lindenmayer, DB & Possingham, HP 2016, 'A Loss-Gain Calculator for Biodiversity Offsets and the Circumstances in Which No Net Loss Is Feasible', *Conservation Letters*, vol. 9, no. 4, pp. 252-259.

Gibbons, P & Lindenmayer, DB 2007, 'Offsets for land clearing: no net loss or the tail wagging the dog?: Comment', *Ecological Management and Restoration*, vol. 8, no. 1, pp. 26-31.

Given, LM 2008, *The Sage encyclopedia of qualitative research methods volume 1*, vol. 1, 2 vols., Sage Publications, Thousand Oaks, California.

Glaser, BG & Strauss, AL 1967, *The discovery of grounded theory: strategies for qualitative research*, Observations, Aldine Publishing Company, Chicago.

Gordon, A, Bull, JW, Wilcox, C & Maron, M 2015, 'Perverse incentives risk undermining biodiversity offset policies', *Journal of Applied Ecology*, no. 2, p. 532.

Gordon, A, Simondson, D, Bekessy, SA, White, M & Moilanen, A 2009, 'Integrating conservation planning and landuse planning in urban landscapes', *Landscape and Urban Planning*, vol. 91, no. 4, pp. 183-194.

Grantham, HS, Pressey, RL, Wells, JA & Beattie, AJ 2010, 'Effectiveness of biodiversity surrogates for conservation planning: different measures of effectiveness generate a kaleidoscope of variation', *PLoS ONE*, vol. 5, no. 7, p. e11430.

Green, J, Willis, K, Hughes, E, Small, R, Welch, N, Gibbs, L & Daly, J 2007, 'Generating best evidence from qualitative research: the role of data analysis', *Australian And New Zealand Journal Of Public Health*, vol. 31, no. 6, pp. 545-550.

Guillet, F & Semal, L 2018, 'Policy flaws of biodiversity offsetting as a conservation strategy', *Biological Conservation*, vol. 221, pp. 86-90.

Gurran, N 2011, *Australian urban land use planning: principles, systems and practice*, 2nd edn, Sydney University Press, Sydney.

Gurran, N, Gilbert, C & Phibbs, P 2015, 'Sustainable development control? Zoning and land use regulations for urban form, biodiversity conservation and green design in Australia', *Journal of environmental planning and management*, p. 26p.

Hamilton, B & Twycross, L 2010, 'Dealing with complexity: integrated natural resource management, local government and biodiversity conservation in the Perth region', *Australasian Plant Conservation*, vol. 18, no. 3, pp. 30-31.

Harris, S 2011, 'Tasmania's native vegetation policy: towards an integrated framework', PhD thesis, School of Government, University of Tasmania, http://eprints.utas.edu.au/11732/.

Hay, I 2010, *Qualitative research methods in human geography*, 3rd edn, OUP Canada, Don Mills, Ontario.

Horák, J 2016, 'Suitability of biodiversity-area and biodiversity-perimeter relationships in ecology: a case study of urban ecosystems', *Urban Ecosystems*, vol. 19, no. 1, pp. 131-142.

Huisman, O & de By, RA (eds) 2001, *Principles of Geographic Information Systems*, ITC Educational Textbook Series 1, The Netherlands.

Ives, CD, Lentini, PE, Threlfall, C, Ikin, K, Shanahan, D, Garrard, G, Bekessy, S, Fuller, RA, Mumaw, L, Rayner, L, Rowe, R, Valentine, L & Kendal, D 2016, 'Cities are hotspots for threatened species', *Global Ecology and Biogeography*, vol. 25, no. 1, pp. 117-126.

Ives, CD, Taylor, MP, Nipperess, DA & Davies, P 2010, 'New directions in urban biodiversity conservation: the role of science and its interaction with local environmental policy', *Environmental and planning law journal*, vol. 27, no. 4, pp. 249-271.

Kelly, A & Farrier, D 1996, 'Local government and biodiversity conservation in New South Wales', *Environmental and planning law journal*, vol. 13, no. 5, p. 374.

Kiesecker, JM, Copeland, H, Pocewicz, A & McKenney, B 2009, 'Development by design: blending landscape-level planning with the mitigation hierarchy', *Frontiers in Ecology and the Environment*, vol. 8, no. 5, pp. 261-266.

Kiesecker, JM, Copeland, H, Pocewicz, A, Nibbelink, N, McKenney, B, Dahlke, J, Holloran, M & Stroud, D 2009, 'A Framework for Implementing Biodiversity Offsets: Selecting Sites and Determining Scale', *Bioscience*, vol. 59, no. 1, pp. 77-84.

Kingborough Council 2000, *Kingborough planning scheme 2000*, Kingborough Council, Kingston, Tasmania.

—— 2016a, *Biodiversity offset policy*, Policy No. 6.10, Kingborough Council, Kingston, Tasmania.

—— 2016b, *Guidelines for the expenditure of the Kingborough Environmental Fund*, Kingborough Council, Kingston, Tasmania.

—— 2018, *Kingborough land use strategy 2018*, unpublished report.

Kirkpatrick, J & Gilfedder, L 1995, 'Maintaining integrity compared with maintaining rare and threatened taxa in remnant bushland in subhumid Tasmania', *Biological Conservation*, vol. 74, no. 1, pp. 1-8.

Kirkpatrick, JB, Barker, P, Brown, MJ, Harris, S & Mackie, R 1995, *The reservation status of Tasmanian vascular plant communities*, Wildlife Scientific Report 95/4, Parks and Wildlife Service, Tasmanian Government, Hobart, Tasmania.

Kirkpatrick, JB, Gilfedder, L & Fensham, R 1988, *City parks and cemeteries: Tasmania's remnant grasslands and grassy woodlands*, Tasmanian Conservation Trust, Hobart, Tasmania.

Kirkpatrick, JB, McDougall, K & Hyde, M 1995, *Australia's most threatened ecosystem: the southeastern lowland native grasslands*, Surrey Beatty & Sons in association with the World Wide Fund for Nature Australia, Chipping Norton, New South Wales.

Kitchener, A & Harris, S 2013, *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation*, 2nd edn, Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

Knight, RI 2011, *Integrated vegetation layer for the Kingborough and Mountain to Marine project areas*, Natural Resource Planning, Hobart, Tasmania.

—— 2016, *Summary of the Regional Ecosystem Model of Tasmanian biodiversity*, Natural Resource Planning, Hobart, Tasmania.

—— 2018, *Priority vegetation map for the Natural Assets Code for Tasmanian Council areas*, Natural Resource Planning, Hobart, Tasmania.

Knight, RI & Cullen, PJ 2009, *A review of strategies for planning and management of the natural resources of biodiversity, freshwater, land and soils in the the Tasmanian midlands*, Natural Resource Planning, Hobart, Tasmania.

—— 2010a, *A rapid assessment method for surveying and mapping biophysical naturalness*.

—— 2010b, *Specifications for a Regional Ecosystem Model of natural resources in the Tasmanian Midlands*, Natural Resource Planning, Hobart, Tasmania.

—— 2012, *A Regional Ecosystem Model for prioritising the planning and management of biodiversity in the Kingborough Council and NRM South 'Mountain to Marine' project areas: a report to Kingborough Council and Natural Resource Management (NRM) South August 2012*, Natural Resource Planning, Hobart, Tasmania.

Koutsamanis, A 2011, 'The role of strategic environmental assessment in environmental impact assessment and the law', *Local Government Law Journal*, vol. 16, p. 12.

Kuempel, CC, Adams, V.M, Possingham, H.P., Bode, M. 2018, 'Bigger or better: the relative benefits of protected area network expansion and enforcement for the conservation of an exploited species', *Conservation Letters. A Journal of the Society for Conservation Biology*, vol. 11, no. 3, p. e12433.

Lagabrielle, E, Botta, A, Daré, W, David, D, Aubert, S & Fabricius, C 2010, 'Modelling with stakeholders to integrate biodiversity into land-use planning – Lessons learned in Réunion Island (Western Indian Ocean)', *Environmental Modelling and Software*, vol. 25, no. 11, pp. 1413-1427.

Latimer, W 2009, 'Assessment of biodiversity at the local scale for environmental impact assessment and land-use planning', *Planning Practice and Research*, vol. 24, no. 3, pp. 389-408.

Lewandowski, AS, Noss, RF & Parsons, DR 2010, 'The effectiveness of surrogate taxa for the representation of biodiversity', *Conservation Biology*, vol. 24, no. 5, pp. 1367-1377.

Liamputtong, P & Ezzy, D 2005, *Qualitative research methods*, 2nd edn, Oxford University Press, South Melbourne.

Lindenmayer, D, Barton, P & Pierson, J 2015, *Indicators and surrogates of biodiversity and environmental change*, CSIRO Publishing, Clayton South, Victoria.

Mac Nally, RC 1990, 'The roles of floristics and physiognomy in avian community composition', *Australian Journal of Ecology*, vol. 15, no. 3, pp. 321-327.

Mamouney, L 2000, 'Should local government be responsible for biodiversity management? A critical review of local government's ability to manage biodiversity loss in NSW through the development process', *Environmental and planning law journal*, vol. 17, no. 2, p. 13.

Mansvelt, J & Berg, L, D 2010, 'Writing qualitative geographies, constructing meaningful geographical knowledges', in I Hay (ed.), *Qualitative research methods in human geography*, Oxford University Press, Don Mills, Ontario, pp. 333-355.

Margerum, RD 1999, 'Implementing integrated planning and management', *Australian Planner*, vol. 36, no. 3, pp. 155-161.

Margules, C & Pressey, R 2000, 'Systematic conservation planning', *Nature*, vol. 405, no. 6783, pp. 243-253.

Maron, M, Bull, JW, Evans, MC & Gordon, A 2015, 'Locking in loss: baselines of decline in Australian biodiversity offset policies', *Biological Conservation*, vol. 192, pp. 504-512.

Maron, M, Gordon, A, Mackey, BG, Possingham, HP & Watson, JEM 2016, 'Interactions Between Biodiversity Offsets and Protected Area Commitments: Avoiding Perverse Outcomes', *Conservation Letters*, vol. 9, no. 5, pp. 384-389.

Maron, M, Hobbs, RJ, Moilanen, A, Matthews, JW, Christie, K, Gardner, TA, Keith, DA, Lindenmayer, DB & McAlpine, CA 2012, 'Faustian bargains? Restoration realities in the context of biodiversity offset policies', *Biological Conservation*, vol. 155, pp. 141-148.

Maron, M, Rhodes, JR & Gibbons, P 2013, 'Calculating the benefit of conservation actions', *Conservation Letters*, vol. 6, no. 5, pp. 359-367.

Marsden, S 2013, 'Strategic environmental assessment in Australian land-use planning', *Environmental and planning law journal*, vol. 30, no. 5, p. 12.

Marsden, SA, John 2006, 'Strategic environmental assessment legislation in Australian states and territories'.

Mason, J 2002, *Qualitative researching*, 2nd edn, Sage Publications, Thousand Oaks, California.

Matthews, D 2010, 'Planning for urban biodiversity in Perth, Western Australia', Masters thesis, School of Earth and Environment, The University of Western Australia, http://repository.uwa.edu.au/R/?func=dbin-jump-full&object_id=30792&local_base=GEN01-INS01.

McCormack, P & McDonald, J 2014, 'Adaptation strategies for biodiversity conservation: has Australian law got what it takes?', *Environmental and planning law journal*, vol. 31, no. 2, pp. 114-136.

McFarland, P 2015, 'The peri-urban land-use planning tangle: an Australian perspective', *International Planning Studies*, vol. 20, no. 3, pp. 161-179.

McKenney, BA & Kiesecker, JM 2010, 'Policy development for biodiversity offsets: a review of offset frameworks', *Environmental Management*, vol. 45, no. 1, pp. 165-176.

Michaels, K 2006, *A manual for assessing vegetation condition in Tasmania, version 1.0*, Resource Management and Conservation, Department of Primary Industries, Water and Environment, Hobart, Tasmania.

Miller, J, Groom, M, Hess, G, Steelman, T, Stokes, D, Thompson, J, Bowman, T, Fricke, L, King, B & Marquardt, R 2008, 'Biodiversity conservation in local planning', *Conservation Biology*, vol. 23, no. 1, pp. 53-63.

Moilanen, A, van Teeffelen, A, Ben-Haim, Y & Ferrier, S 2009, 'How much compensation is enough? A framework for incorporating uncertainty and time discounting when calculating offset ratios for impacted habitat', *Restoration Ecology*, vol. 17, no. 4, pp. 470-478.

Moreno-Mateos, D, Maris, V, Béchet, A & Curran, M 2015, 'The true loss caused by biodiversity offsets', *Biological Conservation*, vol. 192, pp. 552-559.

Natural and Cultural Heritage Division 2015a, *Guidelines for natural values surveys - terrestrial development proposals*, Version 1.0 - 16th April 2015 edn, Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

—— 2015b, *Survey guidelines and management advice for development proposals that may impact on the Tasmanian devil (Sarcophilus harrisii)*, Department of Primary Industries, Parks, Water and Environment, Hobart.

Natural Resource Management Ministerial Council 2010, *Australia's Biodiversity Conservation Strategy 2010-2030*, Department of Sustainability, Environment, Water, Population and Communities, Australian Government, Canberra.

Norris, P 2014, 'Seeking balance: The promise and reality of biodiversity offsetting', *Environmental and planning law journal*, no. 31, pp. 137-147.

North Barker Ecosystem Services 2011, *Vegetation survey and fauna habitat assessment: Hawthorn Drive*, unpublished, 6 December 2011.

Oliver, TH, Smithers, RJ, Beale, CM & Watts, K 2016, 'Are existing biodiversity conservation strategies appropriate in a changing climate?', *Biological Conservation*, vol. 193, pp. 17-26.

Pallant, J 2013, *SPSS survival manual: a step by step guide to data analysis using IBM SPSS*, Maidenhead, Berkshire, England: Allen & Unwin, 2013. 5th ed.

Patton, MQ 2002, *Qualitative research and evaluation methods*, Third edn, Sage Publications, Thousand Oaks, California.

Peel, J 2008, 'Ecologically sustainable development: more than mere lip service?', *Australasian Journal of Natural Resources Law and Policy*, vol. 12, no. 1, p. 34.

Peterson, A, McAlpine, CA, Ward, D & Rayner, S 2007, 'New regionalism and nature conservation: lessons from South East Queensland, Australia', *Landscape and Urban Planning*, vol. 82, no. 3, pp. 132-144.

Peterson, G 2000, 'Scaling ecological dynamics: self-organisation, hierarchical structure, and ecological resilience', *Climate Change*, vol. 44, pp. 291-309.

Peterson, I, Maron, M, Moillanen, A, Bekessy, S & Gordon, A 2018, 'A quantitative framework for evaluating the impact of biodiversity offset policies', *Biological Conservation*, vol. 224, pp. 162-169.

Pickett, EJ, Stockwell, MP, Bower, DS, Garnham, JI, Pollard, CJ, Clulow, J & Mahony, MJ 2013, 'Achieving no net loss in habitat offset of a threatened frog required high offset ratio and intensive monitoring', *Biological Conservation*, vol. 157, pp. 156-162.

Pilgrim, JD, Brownlie, S, Ekstrom, JMM, Gardner, TA, von Hase, A, ten Kate, K, Savy, CE, Stephens, RTT, Temple, HJ, Treweek, J, Ussher, GT & Ward, G 2013, 'A process for assessing the offsetability of biodiversity impacts', *Conservation Letters*, vol. 6, no. 5, pp. 376-384.

Pitney & Bowes 2015, *MapInfo Pro Version 15.2 User Guide*, Pitney Bowes Software Inc., New York.

Planning Institute of Australia 2012, *Comparing legislative systems: a summary of the different planning systems in Australia*, Planning Institute of Australia, unpublished.

Planning Policy Unit 2017, *Tasmanian Planning Reform*, Tasmanian Government, viewed 8 July 2017, http://www.planningreform.tas.gov.au/policies.

Port Phillip and Westernport Catchment Management Authority 2008, *Assessing the effectiveness of local government planning scheme controls in protecting native vegetation in the Port Phillip and Western Port Region*, Port Phillip and Westernport Catchment Management Authority, Victoria.

Powers, J 2000, 'How effective are local government planning schemes in protecting ecosystems?', *Local Government Law Journal*, vol. 5, no. 3, p. 11.

Prahalad, VN & Kriwoken, LK 2010, 'Implementation of the Ramsar convention on wetlands in Tasmania, Australia', *Journal of International Wildlife Law and Policy*, vol. 13, no. 3, pp. 205-239.

Pressey, RL, Cabeza, M, Watts, ME, Cowling, RM & Wilson, KA 2007, 'Conservation planning in a changing world', *Trends in Ecology and Evolution*, vol. 22, no. 11, pp. 583-592.

Pressey, RL, Johnson, IR & Wilson, PD 1994, 'Shades of irreplaceability: towards a measure of the contribution of sites to a reservation goal', *Biodiversity and Conservation*, vol. 3, no. 3, pp. 242-262.

Preston, BJ 2013, 'Adapting to the impacts of climate change: the limits and opportunities of law in conserving biodiversity', *Environmental and planning law journal*, vol. 30, no. 5, p. 15.

Preston, BJ 2016, 'Biodiversity offsets: adequacy and efficacy in theory and practice', *Environmental and planning law journal*, vol. 33, no. 2, pp. 93-117.

QSR International 2014, *NVIVO10 for windows: getting started*, ed. PL QSR International, www.qsrinternational.com.

Quétier, F & Lavorel, S 2011, 'Assessing ecological equivalence in biodiversity offset schemes: key issues and solutions', *Biological Conservation*, vol. 144, no. 12, pp. 2991-2999.

Quétier, F, Regnery, B & Levrel, H 2014, 'No net loss of biodiversity or paper offsets? A critical review of the French no net loss policy', *Environmental Science and Policy*, vol. 38, pp. 120-131.

Rackemann, M 2010, 'The relevance of biodiversity in development assessment in Queensland', paper presented to The Politics of Biodiversity: National Environmental Law Association (NELA) conference 2010, University House, Canberra ACT.

—— 2013, 'Environmental dispute resolution – lessons from the States', *Environmental and planning law journal*, vol. 30, no. 5, p. 13.

Reed, SE, Hilty, JA & Theobald, DM 2013, 'Guidelines and incentives for conservation development in local land-use regulations', *Conservation Biology*.

Reid, R & Stephen, P 2001, *The farmer's forest: multipurpose forestry for Australian farmers*, Australian Master TreeGrower Program, Australia.

Resource Management and Appeals Tribunal 2018a, *Practice direction 12: expert witness*, https://www.rmpat.tas.gov.au/practice_directions.

—— 2018b, *Practice direction 12A: expert witness code of conduct*, https://www.rmpat.tas.gov.au/practice_directions.

Resource Management and Conservation 2006a, *TASVEG change 2005*, Tasmanian Government, Hobart, Tasmania.

—— 2006b, *TASVEG change 2005 - metadata*, Tasmanian Government.

—— 2009a, *Threatened Fauna Observations*, Tasmanian Government, viewed 4/8/2018.

—— 2009b, *Threatened Flora Observations*, Tasmanian Government, viewed 4/8/2018.

Robbins, K 2015, 'The biodiversity paradign shift: adapting the Endangered Species Act to climate change', *Fordham Environmental Law Review*, vol. 27, no. 1, pp. 57-106.

Robinson, D 2009, 'Strategic planning for biodiversity in New South Wales', *Environmental and planning law journal*, vol. 26, pp. 213-235.

Sarkar, S & Margules, C 2002, 'Operationalizing biodiversity for conservation planning', *Journal of Biosciences*, vol. 27, no. 4, pp. 399-308.

Saunders, DL & Tzaros, CL 2011, *National recovery plan for the swift parrot Lathamus discolor*, Birds Australia, Melbourne.

Slocombe, DS 1993, 'Environmental planning, ecosystem science, and ecosystem approaches for integrating environment and development', *Environmental Management*, vol. 17, no. 3, pp. 289-303.

Sodhi, N & Ehrlich, P 2010, *Conservation biology for all*, Oxford University Press, Unites States.

Southern Tasmanian Councils Authority 2011, *Southern Tasmania regional land use strategy 2010-2035*, Southern Tasmanian Councils Authority, Hobart.

—— 2013, *Implementing biodiversity offsets under the Land Use Planning and Approvals Act 1993*, Southern Tasmanian Councils Authority, Hobart.

Sproule, W 2010, 'Content analysis', in M Walter (ed.), *Social research methods*, 2nd edn, Oxford University Press, South Melbourne, Victoria, pp. xxv, 510 p.

Stake, RE 2005, 'Qualitative case studies', in NK Denzin & YS Lincoln (eds), *The Sage handbook of qualitative research*, 3rd edn, Sage Publications, Thousand Oaks, California, pp. 443-466.

State of New South Wales 2007, *Biobanking biodiversity banking and offset scheme: scheme overview*, Department of Environment and Climate Change (NSW), Sydney.

—— 2008a, *Biobanking assessment methodology*, Department of Environment and Climate Change (NSW), Sydney.

—— 2008b, *Biobanking assessment methodology and credit calculator operational manual*, Department of Environment and Climate Change (NSW), Sydney.

—— 2009, *The science behind biobanking*, Department of Environment, Climate Change and Water (NSW), Sydney.

—— 2014, *Biodiversity legislation review OEH paper 4: conservation in land-use planning*, Office of Environment and Heritage (NSW), Sydney.

State of Queensland 2009, *State policy for vegetation management (v2)*, Department of Environment and Resource Management (Qld), Brisbane.

—— 2016, *Queensland planning provisions (v4.0)*, Department of Infrastructure, Local Government and Planning (Qld), Brisbane.

State of the Environment Committee 2011, *Australia state of the environment 2011*, Department of Sustainability, Environment, Water, Population and Communities (Aust), Canberra.

State of Victoria 2013, *Native vegetation gain scoring manual version 1*, Victorian Government Department of Environment and Primary Industries, Melbourne.

—— 2014, *Draft: Habitat hectare version 2 assessment manual*, Victorian Government, Vicotria.

—— 2018, *Victorian planning provisions*, Victorian Government, Australia.

Tarlock, DA 1993, 'Local government protection of biodiversity: what is its niche?', *The University of Chicago Law Review*, no. 2, p. 555.

Tasmanian Government 2017a, *Policy for maintaining a permanent native forest estate*, State of Tasmania, Hobart, Tasmania.

—— 2017b, *Tasmanian Planning Policies*, State of Tasmania, Hobart, Tasmania.

—— 2018, *Tasmanian Planning Scheme - State Planning Provisions*, State of Tasmania, Hobart, Tasmania.

Tasmanian Planning Commission 2014, *Planning Directive No. 1: Common Key Elements Template*, Tasmanian Government, Hobart, Tasmania.

—— 2016a, *Draft State Planning Provisions report*, Tasmanian Planning Commission, Hobart, Tasmania.

—— 2016b, *Planning Directive No. 1. The Format and Structure of Planning Schemes*, State of Tasmania, Hobart, Tasmania.

—— 2017a, *Guideline No. 1 - Local Provision Schedule (LPS) zone and code application*, Tasmanian Government, Hobart, Tasmania.

—— 2017b, *Natural Assets: the new Tasmanian Planning Scheme fact sheet*, Tasmanian Government, Hobart, Tasmania.

—— 2017c, *Planning schemes*, Tasmanian Planning Commission, Hobart, Tasmania.

—— 2017d, *State policies*, Tasmanian Planning Commission, Hobart, Tasmania.

—— 2017e, *Tasmanian Planning Scheme - an overview*, Tasmanian Government, viewed 20 September 2018.

—— 2017f, *Tasmanian Planning System*, Tasmanian Government, Hobart, Tasmania.

Taylor, MP & Ives, C 2009, 'Legislative and policy challenges for the protection of biodiversity and bushland habitats: an evidence-based approach', *Environmental and planning law journal*, vol. 26, p. 14.

ten Kate, K, Bishop, J & Bayon, R 2004, *Biodiversity offsets: views, experience and the business case*, International Union for Conservation of Nature and Natural Resources and Insight Investment Management (Global) Ltd, Gland, Switzerland, Cambridge, UK, London, UK.

The LIST 2015a, *LIST Planning Schemes*, State of Tasmania, LISTmap.

—— 2015b, *Local Government Areas*, State of Tasmania, LISTmap.

Thompson, R 2002, 'Reporting the results of computer-assisted analysis of qualitative research data', *Forum: Qualitative Social Research*, vol. 3, no. 2, pp. 139-153.

Threatened Species Scientific Committee (Tas) 2008, *Lowland grasslands of Tasmania listing advice*, Department of the Environment, Water, Heritage and the Arts (Tasmanian Government), Hobart, Tasmania.

Threatened Species Section 2006, *Flora recovery plan: Tasmania threatened orchids 2006-2010*, Department of Primary Industries, Parks, Water and Environment (Tasmanian Government), Hobart, Tasmania.

—— 2012a, *Chaostola skipper in the Kingborough municipality: extent of habitat, current status and strategic plan*, Department of Primary Industries, Parks, Water and Environment (Tasmanian Government), Hobart.

—— 2012b, *Listing statement for Pardalotus quadragintus (forty-spotted pardalote)*, Department of Primary Industries, Parks, Water and Environment (Tasmanian Government), Hobart, Tasmania.

—— 2016a, *Antipodia chaostola subsp. leucophaea (Chaostola Skipper): species management profile for Tasmania's Threatened Species Link*, Department of Primary Industries, Parks, Water and Environment (Tasmanian Government).

—— 2016b, *Pardalotus quadragintus (forty-spotted pardalote): species management profile for Tasmania's Threatened Species Link*, Department of Primary Industries, Parks, Water and Environment (Tasmanian Government).

—— 2016c, *Sarcophilus harrisii (Tasmanian devil): species management profile for Tasmania's Threatened Species Link*, Department of Primary Industries, Parks, Water and Environment (Tasmanian Government).

Underwood, JG 2011, 'Combining landscape-level conservation planning and biodiversity offset programs: a case study', *Environmental Management*, vol. 47, no. 1, pp. 121-129.

UNEP 2010, *Third Global Biodiversity Outlook (GBO-3)*, UNEP, Nairoobi.

—— 2012, *Fifth Global Biodiversity Outlook (GBO-5)*, UNEP, Nairoobi.

United Nations 1992a, *Agenda 21: earth summit - the United Nations programme of action from Rio*, Rio de Janerio, Brazil, 3 to 14 June 1992.

—— 1992b, *Convention on biological diversity*.

Vicente, G & Partidario, M 2006, 'Stratgic Environmental Assessment - enhancing communication for better environmental decisions', *Environmental Impact Assessment Review*, no. 26, pp. 696-706.

Walker, S, Brower, AL, Stephens, RTT & Lee, WG 2009, 'Why bartering biodiversity fails', *Conservation Letters*, vol. 2, no. 4, pp. 149-157.

Wallace, K 2012, 'Values: drivers for planning biodiversity management', *Environmental Science and Policy*, vol. 17, pp. 1-11.

Walter, M (ed.) 2010, *Social research methods*, 2nd edn, Oxford University Press, South Melbourne, Victoria.

Webb, M 2008, *Swift parrot breeding season survey report - 2007/2008*, Threatened Species Section, Biodiversity Branch, Tasmanian Department of Primary Industries and Water.

Webb, M, Holdsworth, M & Webb, J 2012, *Nesting requirements of the endangered Swift Parrot (Lathamus discolor)*, CSIRO Publishing, http://dx.doi.org/10.1071/MU11014.

Webb, R 2009, 'Victoria's native vegetation framework - achieving 'net gain' at the urban growth boundary?', *Environmental and planning law journal*, vol. 26, p. 12.

Welch, J 2018, *Cambria, Tasmania: Amendment to the Glamorgan Spring Bay Interim Planning Scheme*, ireneinc planning and urban design.

Westgate, M 2015, 'Surrogates for the distribution and trajectory of biodiversity', in D Lindenmayer, P Barton & J Pierson (eds), *Indicators and Surrogates of Biodiversity and Environmental Change*, CSIRO Publishing, Clayton South, Victoria.

Whitehead, AL, Kujala, H & Wintle, BA 2017, 'Dealing with Cumulative Biodiversity Impacts in Strategic Environmental Assessment: A New Frontier for Conservation Planning', *Conservation Letters*, vol. 10, no. 2, pp. 195-204.

Wickham, M & Woods, M 2005, *Reflecting on the strategic use of CAQDAS to manage and report on the qualitative research process*.

Willey, SJ 2007, 'Planning appeal processes: reflections on a comparative study', *Environment and Planning*, vol. 39, no. 7, pp. 1676-1698.

Williams, P 2012, 'Managing urbanisation and environmental protection in Australian cities', *International Journal of Law in the Built Environment*, vol. 4, no. 3, pp. 217-232.

Zikmund, WG, Babbin, BJ, Carr, JC & Griffin, M 2010, *Business research methods*, 8th edn, South-Western Cengage Learning, Mason, Ohio.

Zinngrebe, YM 2018, 'Mainstreaming across political sectors: Assessing biodiversity policy integration in Peru', *Environmental Policy and Governance*, vol. 28, no. 3, pp. 153-171.

Appendix I - Survey instrument

Achieving effective biodiversity conservation outcomes through local government planning

Achieving effective biodiversity conservation outcomes through local

Purpose of the survey

Researchers at UTAS are investigating the role of local government in biodiversity conservation through the land use planning and development approval process.

The purpose of this study is to:

(a) determine the role of local government in regulating impacts of use or development on biodiversity in Tasmania;

(b) examine the extent to which biodiversity is and should be integrated into local government statutory planning.

Please note, the focus of this research is *native* biodiversity.

Your participation in the research is voluntary and there are no consequences if you decide not to participate. Responses will be treated as confidential and your responses will not be identifiable in any publications arising from the study. Participation in the survey will be taken as consent.

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***1. Which Council do you currently work for?**

If you work for more than one Council, please complete a separate survey for each Council.

Please note, you and your Council will not be identifiable in any of publications arising from this survey.

- Break O'Day Council
- Brighton Council
- Burnie City Council
- Central Coast Council
- Central Highlands Council
- Circular Head Council
- Clarence City Council
- Derwent Valley Council
- Devonport City Council
- Dorset Council
- Flinders Council
- George Town Council
- Glamorgan Spring Bay Council
- Glenorchy City Council
- Hobart City Council
- Huon Valley Council
- Kentish Council
- Kingborough Council
- King Island Council
- Latrobe Council
- Launceston City Council
- Meander Valley Council
- Northern Midlands Council
- Sorell Council
- Southern Midlands Council
- Tasman Council

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- Waratah-Wynyard Council
- West Coast Council
- West Tamar Council

***2. Which of the following best describes your current role in Council?**

- NRM Officer/Coordinator
- Statutory Planner
- Strategic Planner
- Environmental Planner
- Manager - Planning
- Manager - NRM
- Other (please specify)

***3. How long have you been in this role in this Council?**

- Less than 12 months
- 1-5 years
- More than 5 years

***4. What is your level of education? (Select the highest level that applies)**

- Secondary Education
- Certificate
- Advanced Diploma or Diploma
- Bachelor degree – Arts
- Bachelor degree – Science
- Bachelor degree - Law
- Graduate Diploma or Graduate Certificate
- Post-graduate degree
- Other (please specify)

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*5. What is your age?

- Under 20
- 20-29
- 30-39
- 40-49
- 50 and over

*6. What is your gender?

- Male
- Female

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***7. What are the key drivers of development pressure in your local government area?**

(Please rank in order of significance, starting with 1 as the most significant. If the type of development is not relevant, please select N/A)

Rank	Driver	N/A
☐	Peri-urban/rural residential development and subdivision	☐ N/A
☐	Agriculture and resource use	☐ N/A
☐	Other	☐ N/A
☐	Commercial development	☐ N/A
☐	Industrial development	☐ N/A
☐	Greenfield development	☐ N/A
☐	Residential development and subdivision	☐ N/A
☐	Infrastructure	☐ N/A
☐	Coastal dependent development	☐ N/A
☐	Tourism	☐ N/A

***8. To what extent do you agree with the following statement:**

The objective of biodiversity conservation *"cannot be effectively met unless biodiversity is also a fundamentally important consideration in land use planning and development control. Unless protection of biodiversity is linked with planning and development, then regulatory authorities responsible for biodiversity management and protection are fighting a losing battle"* **(GM Bates, Environmental Law in Australia, 2013:554).**

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree

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***9. How often does your Council *currently* consider the impacts of use or development on biodiversity as part of the development approval process?**

- Never
- Occasionally
- Routinely
- Always
- Unsure

Please add any additional comments or qualifications

Achieving effective biodiversity conservation outcomes through local

***10. What level of information does your Council usually require to undertake their assessment? (Select all that apply)**

- [ ] Desktop analysis using the Natural Values Atlas, TASVEG and other publicly available data
- [ ] Council mapping
- [ ] A field-based assessment by Council staff
- [ ] A field-based assessment by a qualified ecologist
- [ ] Other (please specify)

***11. To what extent does development regulated by local government under the *Land Use Planning and Approvals Act 1993* coincide with areas containing biodiversity in your municipality?**

- ( ) Development does not occur in areas containing biodiversity
- ( ) A limited level of development occurs in areas containing biodiversity
- ( ) A moderate level of development occurs in areas containing biodiversity
- ( ) A significant level of development occurs in areas containing biodiversity
- ( ) Unsure of the level of development occurring in areas containing biodiversity

***12. Does *your* professional role involve considering the impacts of use or development on biodiversity as part of the development approval process?**

- ( ) Yes, predominantly
- ( ) Yes, occasionally
- ( ) No, never

Please provide any additional comments or qualifications

Achieving effective biodiversity conservation outcomes through local

***13. In what capacity do you consider the impacts of use or development on biodiversity as part of the development approval process? (Select all that apply)**

- Informal referral and advice
- Formal referral and advice
- Assessment against the planning Scheme provisions, including recommending approval/refusal and drafting conditions
- Strategic planning, including scheme amendments and land use planning
- Monitoring and compliance
- Other (please specify)

***14. Are there other people in your organisation who consider the impacts of use or development on biodiversity as part of the development approval process?**

- Yes (If yes, please complete the survey and also forward the survey on to these people)
- No (If no, please complete the survey to the best of your knowledge)
- Don't know

***15. Which of the following best describes the *current* status of the planning scheme (s) relevant to the municipality where you work?**

- Scheme(s) certified prior to the development of Regional Land Use Strategies, Regional Model Schemes and State Planning Template **and** Draft Interim Scheme being finalised for endorsement by Council
- Scheme(s) certified prior to the development of Regional Land Use Strategies, Regional Model Schemes and State Planning Template **and** Draft Interim Scheme submitted to the Tasmanian Planning Commission
- Interim Planning Scheme in effect, hearings yet to commence
- Interim Planning Scheme in effect, hearings in progress
- Certified Planning Scheme consistent with the Regional Land Use Strategies, Regional Model Schemes and State Planning Template
- Other (please specify)

Achieving effective biodiversity conservation outcomes through local

***16. Do the planning schemes in your municipality *currently* include any of the following planning scheme provisions aimed at maintaining and/or protecting biodiversity? (Select all that apply)**

- [ ] Scheme objectives
- [ ] Zone objectives
- [ ] Code, Overlay or Schedule objectives
- [ ] Zone standards
- [ ] Code, Overlay or Schedule standards
- [ ] Don't know
- [ ] Other (please specify)

***17. How adequate are the planning scheme provisions in your municipality in relation to biodiversity? (Please rate on a scale of 1-5, with 1 being grossly inadequate and 5 being with excessive)**

- 1 (Grossly inadequate)
- 2
- 3
- 4
- 5 (Excessive)

Please provide any additional comments or qualifications

Achieving effective biodiversity conservation outcomes through local

***18. How often are the impacts of use or development on biodiversity addressed through the inclusion of conditions on development use permits?**

- Never
- Occasionally
- Routinely
- Always
- Don't know

Please provide any additional comments or qualifications

***19. How often does your Council enforce conditions on the permit and the planning scheme requirements?**

- Never
- Occasionally
- Routinely
- Always
- Don't know

Please provide any additional comments or qualifications

***20. Has your Council ever taken Section 64 proceedings under the *Land Use Planning and Approvals Act 1993* to enforce planning scheme requirements in relation to biodiversity provisions?**

- Yes but only once
- Yes 1-5 times
- Yes > 5 times
- No
- Don't know

Achieving effective biodiversity conservation outcomes through local

***21. Please indicate the outcome of these proceedings by selecting the number of instances of each outcome from the drop down menu below. (Where an outcome is not relevant select 0)**

	Number of instances
There was a mediated outcome that resulted in a level of restoration and remediation	
The Tribunal ordered rehabilitation and remediation	
The proceedings resulted in a prosecution	
The proceedings were unsuccessful and no outcome was achieved	
I'm not sure of the outcome of the proceedings	

Other (please specify)

***22. How often does your Council use biodiversity offsets to mitigate impacts on biodiversity?**

- Never
- Occasionally
- Routinely
- Don't know

Please provide any additional comments or qualifications

Achieving effective biodiversity conservation outcomes through local

***23. Does your Council intend to use biodiversity offsets in the future?**

- Yes
- No
- Don't know

Please add any additional comments or qualifications

***24. Has your Council ever used Part 5 Agreements to protect biodiversity values through the development approval process?**

- Yes
- No
- Don't know

Please provide any additional comments or qualifications

Achieving effective biodiversity conservation outcomes through local

*25. Is there a Council monitoring program for ensuring compliance with Part 5 Agreements?

- Yes
- No but one is being developed
- No
- Don't know

*26. Has your Council ever enforced the requirements of a Part 5 Agreement?

- Never
- Occasionally
- Routinely
- Always
- Don't know

Please provide any additional comments or qualifications


Achieving effective biodiversity conservation outcomes through local

*27. Have you ever recommended a proposal be refused on biodiversity grounds?

- Yes
- No
- Don't know

Please provide any additional comments or qualifications

*28. Are you aware of any development approvals which have been refused on biodiversity grounds?

- Yes
- No
- Don't know

Please provide any details if known

Achieving effective biodiversity conservation outcomes through local

***29. Are you aware of any proposals that did not proceed at least partly on the basis of biodiversity grounds? (Where there has been more than one instance, please select all that apply)**

- [ ] Yes - further information outstanding for > 2 years
- [ ] Yes - application withdrawn prior to staff assessment and recommendation
- [ ] Yes - application withdrawn after staff assessment and recommendation but prior to Council decision
- [ ] Yes - permit issued subject to conditions but no substantial commencement
- [ ] Yes - permit issued subject to conditions but unable to satisfy permit conditions
- [ ] No
- [ ] Don't know
- [ ] Other (please specify)

***30. Are you aware of any development applications which have involved an appeal on biodiversity grounds?**

- ( ) No
- ( ) Don't know
- ( ) Yes (please specify the outcome of the appeal)

Achieving effective biodiversity conservation outcomes through local

***31. Does your Council have adequate resources, including human resources, to assess impacts of land use planning and development on biodiversity in relation to any relevant planning scheme provisions?**

- No
- To a limited extent
- To some extent
- Most of the time
- Yes
- Don't know

Please provide any additional comments or qualifications

***32. How often does your Council rely on the advice of ecological consultants engaged by the applicant to assess the impacts of use or development on biodiversity as part of the development approval process?**

- Never
- Occasionally
- Routinely
- Always
- Don't know

***33. How often does your Council directly seek their own external third party advice to inform their assessment of the impacts of use or development on biodiversity as part of the development approval process?**

- Never
- Occasionally
- Routinely
- Always
- Don't know

Achieving effective biodiversity conservation outcomes through local

***34. If your Council does directly seek external third party advice, from whom is it sought? (Select all that apply)**

- Ecological consultants
- Department of Primary Industries, Parks, Water and Environment
- Other (please specify)

***35. To what extent do you agree with the following statements about biodiversity mapping?**

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Biodiversity mapping should be incorporated into the planning scheme as a statutory overlay					
A statutory biodiversity overlay should indicate the broad area where biodiversity is a relevant consideration					
A statutory biodiversity overlay should specify the type and location of biodiversity values					
Decisions about biodiversity should rely on the statutory map not field-based assessments					
Biodiversity mapping is a useful tool that indicates when biodiversity considerations may be relevant					
Biodiversity mapping is not reliable enough to be used as a statutory overlay					
Biodiversity mapping is totally unreliable and should not be used at all					

Achieving effective biodiversity conservation outcomes through local

***36. Whose role do you think it *currently* is to consider the impacts of use or development on biodiversity as part of the development approval process (Select all that apply)**

	Primary regulator	Referral agency	Advice only	Undecided	N/A
Local Government	○	○	○	○	○
Forest Practices Authority	○	○	○	○	○
Department of Primary Industries Parks Water and Environment	○	○	○	○	○
Commonwealth Government	○	○	○	○	○

Other (specify)

37. Are you aware the Forest Practices Regulations were amended in 2009 devolving responsibility for regulating clearance of native vegetation and associated impacts on biodiversity to local government, where a permit for buildings, works and associated development (including subdivision) is required under the *Land Use Planning and Approvals Act 1993

○ Yes

○ No

Achieving effective biodiversity conservation outcomes through local

***38. Did these amendments change how your Council considered the impacts of use or development on biodiversity regulated under the *Land Use Planning and Approvals Act 1993*?**

- No
- Don't know
- Yes (please specify)

***39. What role do you think the following organisations *should* play in considering the impacts of use or development on biodiversity as part of the development approval process?**

	Primary regulator	Referral agency	Advice only	Undecided	N/A
Local government					
Forest Practices Authority					
Department of Primary Industries Parks Water and Environment					
Commonwealth government					

Other (please specify)

Achieving effective biodiversity conservation outcomes through local

***40. What biodiversity values *should* local government consider when assessing the impacts of use or development on biodiversity as part of the development approval process? (Please select the option that best describes your views)**

- Biodiversity values of *local* and/or *regional* significance only, irrespective of whether or not impacts on values of state and national significance are adequately addressed by state and national regulation
- *All* relevant biodiversity values, providing these values are not addressed by state and national regulation
- *All* relevant biodiversity values, even where these values are addressed by state and national regulation
- Local government has no role in considering the impacts of development on biodiversity

Please provide any additional comments or suggestions

Achieving effective biodiversity conservation outcomes through local

***41. To what extent do you agree with the following statements about the inclusion of a Biodiversity Code in planning schemes?**

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
A Biodiversity Code should be consistent across the *state*, with *no* regional or local variation					
A Biodiversity Code should be *broadly consistent* across the *state*, with *some* regional or local variation					
A Biodiversity Code should be consistent across the *region*, with *no* local variation					
A Biodiversity Code should be *broadly consistent* across the *region*, with *some* local variation					
Each Council should have the discretion to determine what is incorporated into a Biodiversity Code					
Each Council should be required to adopt a Biodiversity Code					
Each Council should have the discretion to determine whether or not they adopt a Biodiversity Code at all					

Please provide any additional comments or qualifications

Achieving effective biodiversity conservation outcomes through local

*** 42. Assuming local government does have a role in considering the impacts of use or development on biodiversity as part of the development approval process, do you think there should be consistency in how Councils assess these impacts and how other regulators assess impacts for other types of development, such as forestry and dam construction?**

- Yes
- No
- Undecided

Please provide any additional comments or qualifications

Achieving effective biodiversity conservation outcomes through local

***43. Assuming local government does have a role in considering the impacts of use or development on biodiversity as part of the development approval process, how critical are the following kinds of state government support to local government in undertaking this function?**

(Please rate on a scale of 1-5, with 1 being irrelevant and 5 being critical)

	1 (irrelevant)	2	3	4	5 (critical)
Broad clarification on the role of local government					
Broad clarification on what planning provisions Councils should incorporate into their planning schemes					
Planning directives specifying what planning provisions Councils need to incorporate into their planning schemes ie a Statewide Biodiversity Code					
Decision support guidelines detailing how local government should assess applications impacting biodiversity					
Improved spatial information and mapping tools					
Coordination of monitoring					
Expert advice on applications					
Expert advice on the adequacy of consultants reports					
Provision of expert witnesses for hearings in the Resource Management and Planning Appeals Tribunal					
Provision of expert witnesses for hearings in the Tasmanian Planning Commission					
Financial resources					

Other (please specify)

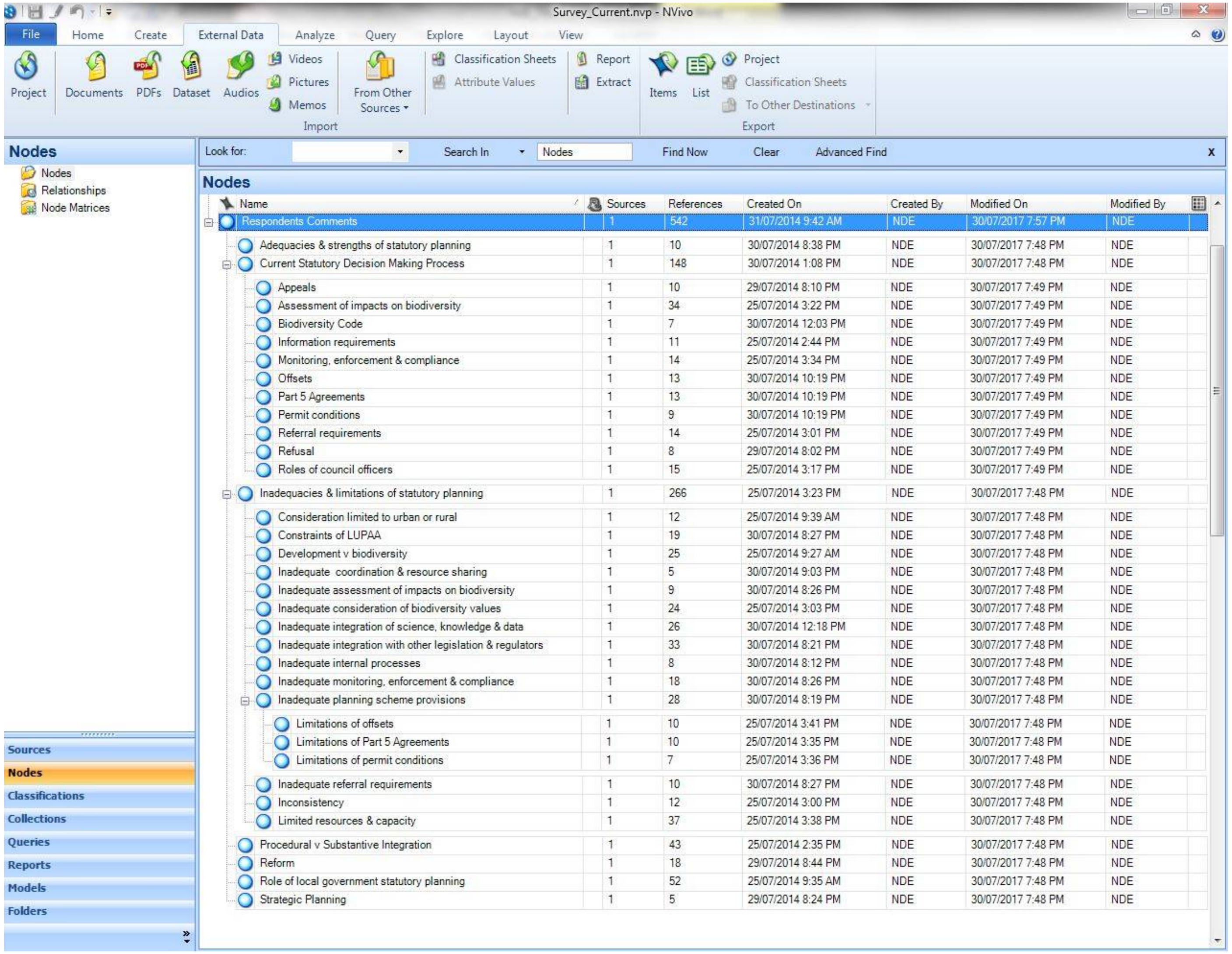
Achieving effective biodiversity conservation outcomes through local

44. If you have any other comments you would like to make in relation to the role of local government in achieving biodiversity conservation outcomes through the development approval process, feel free to make them in the box below.

*** 45. Would you be interested in participating in a semi-structured interview exploring the issues and questions raised in this survey in more depth?**

- No
- Yes (please provide your contact details below to enable the research team to contact you to discuss participation)

Appendix II - Survey coding



Name	Sources	References	Created On	Created By	Modified On	Modified By
Respondents Comments	1	542	31/07/2014 9:42 AM	NDE	30/07/2017 7:57 PM	NDE
Adequacies & strengths of statutory planning	1	10	30/07/2014 8:38 PM	NDE	30/07/2017 7:48 PM	NDE
Current Statutory Decision Making Process	1	148	30/07/2014 1:08 PM	NDE	30/07/2017 7:48 PM	NDE
Appeals	1	10	29/07/2014 8:10 PM	NDE	30/07/2017 7:49 PM	NDE
Assessment of impacts on biodiversity	1	34	25/07/2014 3:22 PM	NDE	30/07/2017 7:49 PM	NDE
Biodiversity Code	1	7	30/07/2014 12:03 PM	NDE	30/07/2017 7:49 PM	NDE
Information requirements	1	11	25/07/2014 2:44 PM	NDE	30/07/2017 7:49 PM	NDE
Monitoring, enforcement & compliance	1	14	25/07/2014 3:34 PM	NDE	30/07/2017 7:49 PM	NDE
Offsets	1	13	30/07/2014 10:19 PM	NDE	30/07/2017 7:49 PM	NDE
Part 5 Agreements	1	13	30/07/2014 10:19 PM	NDE	30/07/2017 7:49 PM	NDE
Permit conditions	1	9	30/07/2014 10:19 PM	NDE	30/07/2017 7:49 PM	NDE
Referral requirements	1	14	25/07/2014 3:01 PM	NDE	30/07/2017 7:49 PM	NDE
Refusal	1	8	29/07/2014 8:02 PM	NDE	30/07/2017 7:49 PM	NDE
Roles of council officers	1	15	25/07/2014 3:17 PM	NDE	30/07/2017 7:49 PM	NDE
Inadequacies & limitations of statutory planning	1	266	25/07/2014 3:23 PM	NDE	30/07/2017 7:48 PM	NDE
Consideration limited to urban or rural	1	12	25/07/2014 9:39 AM	NDE	30/07/2017 7:48 PM	NDE
Constraints of LUPAA	1	19	30/07/2014 8:27 PM	NDE	30/07/2017 7:48 PM	NDE
Development v biodiversity	1	25	25/07/2014 9:27 AM	NDE	30/07/2017 7:48 PM	NDE
Inadequate coordination & resource sharing	1	5	30/07/2014 9:03 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate assessment of impacts on biodiversity	1	9	30/07/2014 8:26 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate consideration of biodiversity values	1	24	25/07/2014 3:03 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate integration of science, knowledge & data	1	26	30/07/2014 12:18 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate integration with other legislation & regulators	1	33	30/07/2014 8:21 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate internal processes	1	8	30/07/2014 8:12 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate monitoring, enforcement & compliance	1	18	30/07/2014 8:26 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate planning scheme provisions	1	28	30/07/2014 8:19 PM	NDE	30/07/2017 7:48 PM	NDE
Limitations of offsets	1	10	25/07/2014 3:41 PM	NDE	30/07/2017 7:48 PM	NDE
Limitations of Part 5 Agreements	1	10	25/07/2014 3:35 PM	NDE	30/07/2017 7:48 PM	NDE
Limitations of permit conditions	1	7	25/07/2014 3:36 PM	NDE	30/07/2017 7:48 PM	NDE
Inadequate referral requirements	1	10	30/07/2014 8:27 PM	NDE	30/07/2017 7:48 PM	NDE
Inconsistency	1	12	25/07/2014 3:00 PM	NDE	30/07/2017 7:48 PM	NDE
Limited resources & capacity	1	37	25/07/2014 3:38 PM	NDE	30/07/2017 7:48 PM	NDE
Procedural v Substantive Integration	1	43	25/07/2014 2:35 PM	NDE	30/07/2017 7:48 PM	NDE
Reform	1	18	29/07/2014 8:44 PM	NDE	30/07/2017 7:48 PM	NDE
Role of local government statutory planning	1	52	25/07/2014 9:35 AM	NDE	30/07/2017 7:48 PM	NDE
Strategic Planning	1	5	29/07/2014 8:24 PM	NDE	30/07/2017 7:48 PM	NDE

Appendix III - Interview consent form

Geography and Environmental Studies
School of Land and Food
Private Bag 78 Hobart Tasmania 7001 Australia
Telephone (03) 6226 2463 Facsimile (03) 6226 2989
Nicole.denExter@utas.edu.au

Achieving effective biodiversity conservation outcomes through land use planning and development approval processes

Consent form for interview participants

1. I agree to take part in the research study named above.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves participating in a one-hour semi-structured interview at my place of work or other nominated location. I understand this interview will be audio-recorded.
5. I understand that participation involves no foreseeable risks.
6. I understand that all research data will be de-identified and securely stored on the University of Tasmania premises for five years from the publication of the study results, and will then be destroyed.
7. Any questions that I have asked have been answered to my satisfaction.
8. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.
9. I understand that the results of the study will be published so that I cannot be identified as a participant unless I subsequently agree in writing to be identified as a participant in the publication of the study results.
10. I understand that my participation is voluntary and that I may withdraw at any time without any effect.

    If I so wish, I may request that any data I have supplied be withdrawn from the research.

Participant Consent Form v3 19/03/2015

Participant's name: ____

Participant's signature: ____

Date: ____________________

Statement by Investigator

☐ I have explained the project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

If the Investigator has not had an opportunity to talk to participants prior to them participating, the following must be ticked.

☐ The participant has received the Information Sheet where my details have been provided so participants have had the opportunity to contact me prior to consenting to participate in this project.

Investigator's name: ____

Investigator's signature: ____

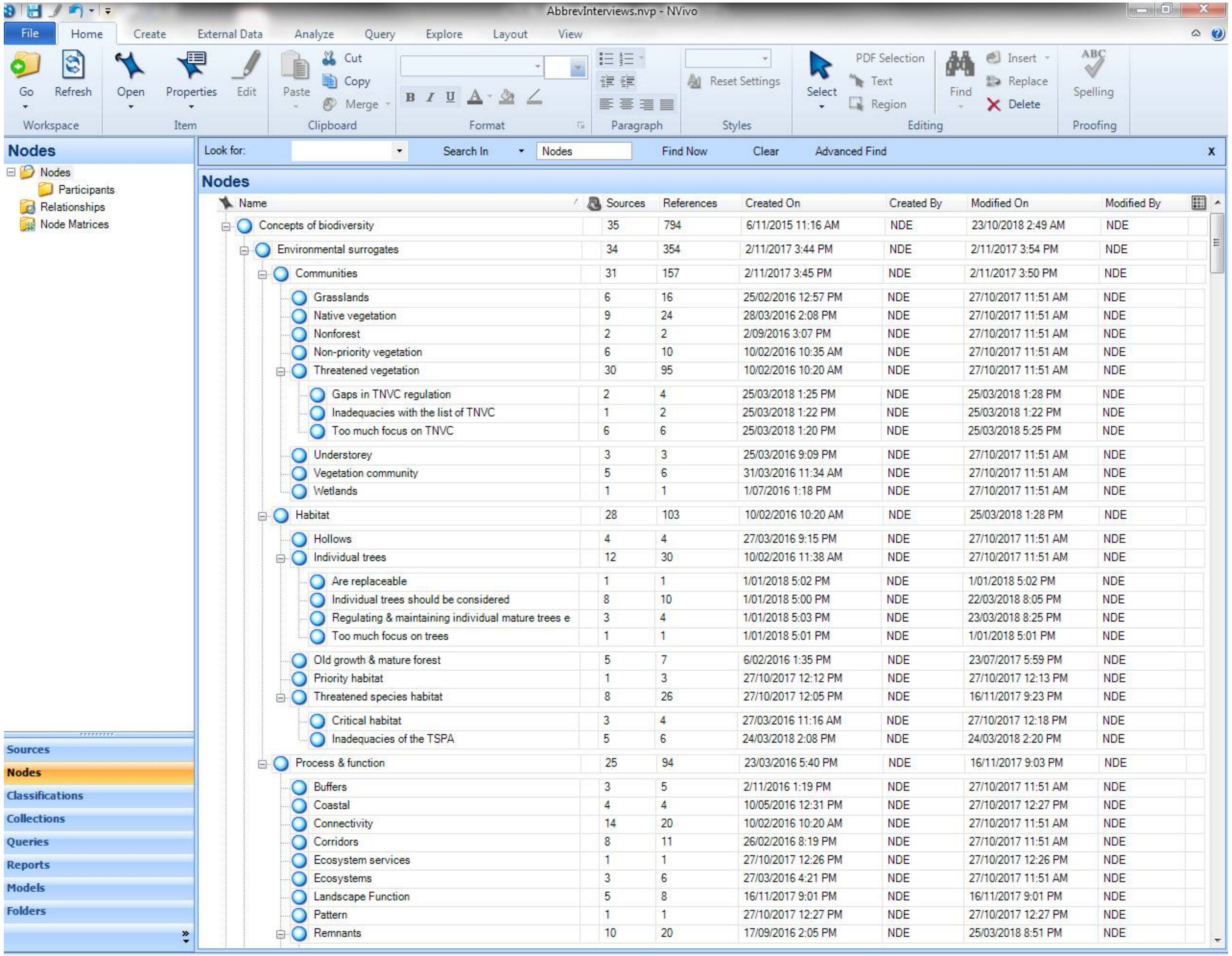
Date: ____________________

Appendix IV - Indicative interview questions

Question	Sub-questions	Specific topics & issues
Brief social/professional characteristics – qualifications & role		
What is your qualification and current profession?	How long have you been a …?	Experience of land use planning & biodiversity conservation
What does your role involve?	What is your involvement in biodiversity regulation as part of the land use planning and development approval process? Can you provide examples?	
Understanding of biodiversity conservation & land use planning		
Can you describe your understanding of how biodiversity is taken into consideration during the land use planning process specifically?	Whose role is it? What values are considered? How it is integrated? Is your agency involved? Can you identify any situations where a proposal has been refused on biodiversity grounds? Substantially altered? Do you think biodiversity consideration via the land use planning process should be consistent with regulation under other process eg FPA?	Permit & decision making processes Roles & responsibilities
Effectiveness		
Do you think this process and current regulatory instruments are effective in achieving biodiversity conservation outcomes?	Do you think they are achieving meaningful outcomes for biodiversity? What works well? What's not working well? Do you think there are gaps? Do you think they are legally robust? What about Part 5 Agreements?	Views and experiences on current regulatory approaches to biodiversity conservation
What do you think are the key elements of effective biodiversity regulation?	What do statutory instruments/regulations need to incorporate to achieve effective outcomes?	Are broad objectives sufficient? Are specific

Question	Sub-questions	Specific topics & issues
	How should they identify the values? Should absolute thresholds be used? EG ratios? Or should they be flexible? How is this achieved in a manner which is legally robust? Whose role should it be to regulate impacts on biodiversity arising from the land use planning process? Do you think there are situations where biodiversity conservation should outweigh development? Are there situations where biodiversity values are so significant the development should either be redesigned to avoid impacts or even refused? And who should decide? On what basis?	performance standards necessary? Mapping v description Flexibility v certainty Roles & responsibilities – developer, consultants, regulator, arbiter?
Ideal State Code		
Given the intention for a single Statewide Planning Scheme, what would a state Biodiversity Code look like to you?	How would it work? What would it include? What about exemptions? How would it integrate local and state regulations?	Integration across regulations & tiers of government Exemptions Criteria Exceptional circumstances Offsets
Way forward		
What do you see as the key challenges for achieving effective biodiversity conservation outcomes through regulation?	Is change or reform needed to achieve effective biodiversity regulation? If so, what?	

Appendix V - Interview coding



Nodes

Name	Sources	References	Created On	Created By	Modified On	Modified By
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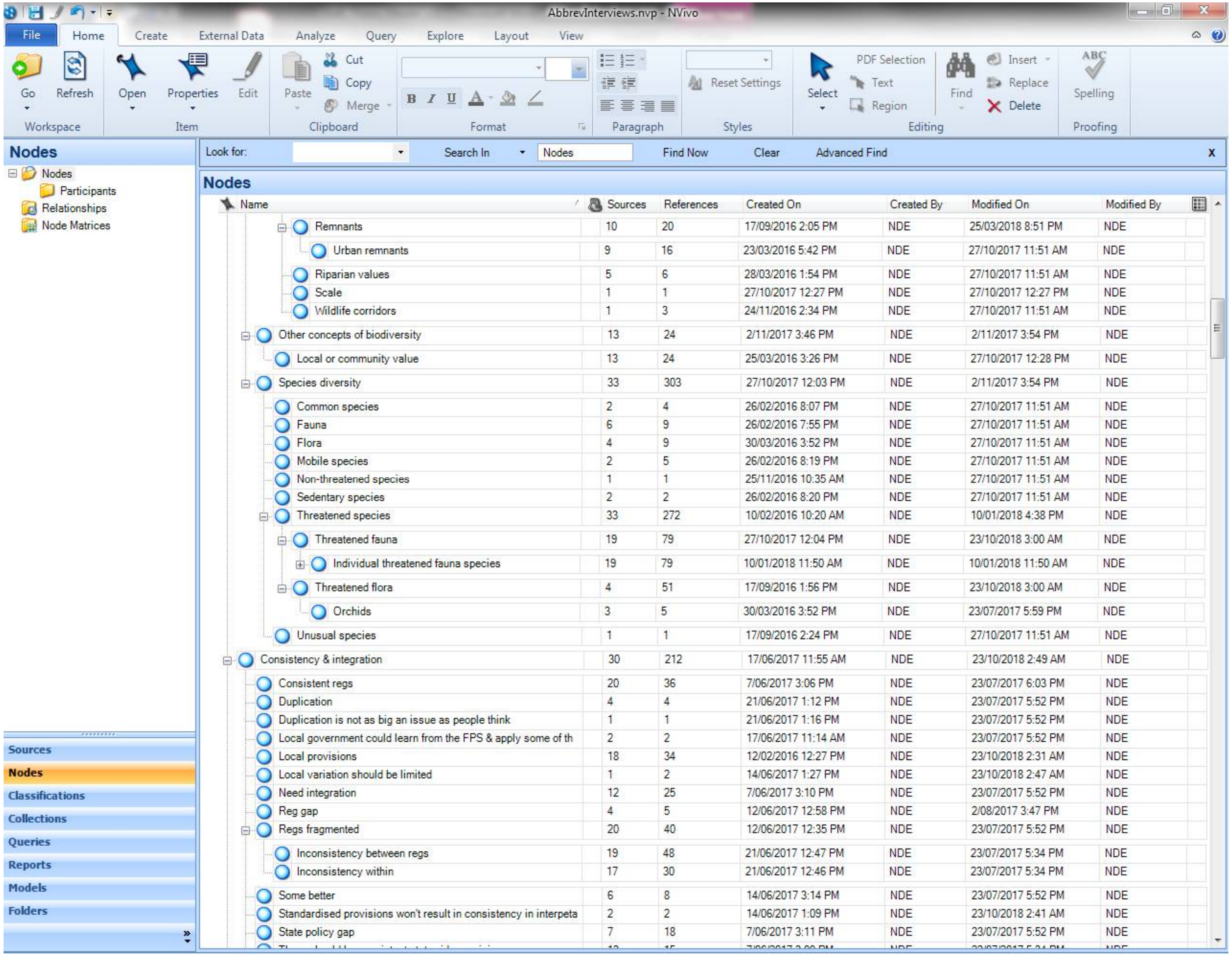
Environmental surrogates	34	354	2/11/2017 3:44 PM	NDE	2/11/2017 3:54 PM	NDE
Communities	31	157	2/11/2017 3:45 PM	NDE	2/11/2017 3:50 PM	NDE
Grasslands	6	16	25/02/2016 12:57 PM	NDE	27/10/2017 11:51 AM	NDE
Native vegetation	9	24	28/03/2016 2:08 PM	NDE	27/10/2017 11:51 AM	NDE
Nonforest	2	2	2/09/2016 3:07 PM	NDE	27/10/2017 11:51 AM	NDE
Non-priority vegetation	6	10	10/02/2016 10:35 AM	NDE	27/10/2017 11:51 AM	NDE
Threatened vegetation	30	95	10/02/2016 10:20 AM	NDE	27/10/2017 11:51 AM	NDE
Gaps in TNVC regulation	2	4	25/03/2018 1:25 PM	NDE	25/03/2018 1:28 PM	NDE
Inadequacies with the list of TNVC	1	2	25/03/2018 1:22 PM	NDE	25/03/2018 1:22 PM	NDE
Too much focus on TNVC	6	6	25/03/2018 1:20 PM	NDE	25/03/2018 5:25 PM	NDE
Understorey	3	3	25/03/2016 9:09 PM	NDE	27/10/2017 11:51 AM	NDE
Vegetation community	5	6	31/03/2016 11:34 AM	NDE	27/10/2017 11:51 AM	NDE
Wetlands	1	1	1/07/2016 1:18 PM	NDE	27/10/2017 11:51 AM	NDE
Habitat	28	103	10/02/2016 10:20 AM	NDE	25/03/2018 1:28 PM	NDE
Hollows	4	4	27/03/2016 9:15 PM	NDE	27/10/2017 11:51 AM	NDE
Individual trees	12	30	10/02/2016 11:38 AM	NDE	27/10/2017 11:51 AM	NDE
Are replaceable	1	1	1/01/2018 5:02 PM	NDE	1/01/2018 5:02 PM	NDE
Individual trees should be considered	8	10	1/01/2018 5:00 PM	NDE	22/03/2018 8:05 PM	NDE
Regulating & maintaining individual mature trees e	3	4	1/01/2018 5:03 PM	NDE	23/03/2018 8:25 PM	NDE
Too much focus on trees	1	1	1/01/2018 5:01 PM	NDE	1/01/2018 5:01 PM	NDE
Old growth & mature forest	5	7	6/02/2016 1:35 PM	NDE	23/07/2017 5:59 PM	NDE
Priority habitat	1	3	27/10/2017 12:12 PM	NDE	27/10/2017 12:13 PM	NDE
Threatened species habitat	8	26	27/10/2017 12:05 PM	NDE	16/11/2017 9:23 PM	NDE
Critical habitat	3	4	27/03/2016 11:16 AM	NDE	27/10/2017 12:18 PM	NDE
Inadequacies of the TSPA	5	6	24/03/2018 2:08 PM	NDE	24/03/2018 2:20 PM	NDE
Process & function	25	94	23/03/2016 5:40 PM	NDE	16/11/2017 9:03 PM	NDE
Buffers	3	5	2/11/2016 1:19 PM	NDE	27/10/2017 11:51 AM	NDE
Coastal	4	4	10/05/2016 12:31 PM	NDE	27/10/2017 12:27 PM	NDE
Connectivity	14	20	10/02/2016 10:20 AM	NDE	27/10/2017 11:51 AM	NDE
Corridors	8	11	26/02/2016 8:19 PM	NDE	27/10/2017 11:51 AM	NDE
Ecosystem services	1	1	27/10/2017 12:26 PM	NDE	27/10/2017 12:26 PM	NDE
Ecosystems	3	6	27/03/2016 4:21 PM	NDE	27/10/2017 11:51 AM	NDE
Landscape Function	5	8	16/11/2017 9:01 PM	NDE	16/11/2017 9:01 PM	NDE
Pattern	1	1	27/10/2017 12:27 PM	NDE	27/10/2017 12:27 PM	NDE
Remnants	10	20	17/09/2016 2:05 PM	NDE	25/03/2018 8:51 PM	NDE



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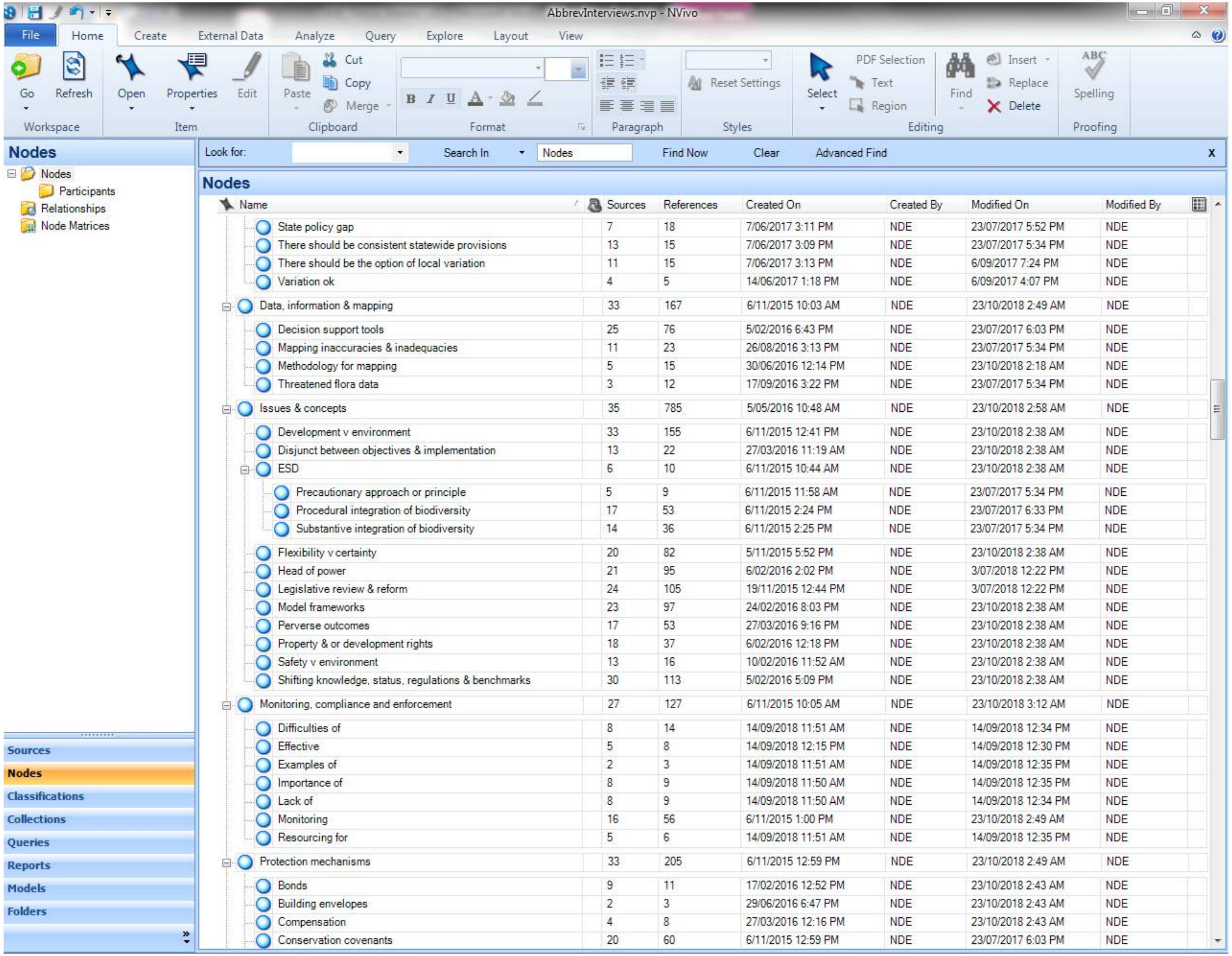
Remnants	10	20	17/09/2016 2:05 PM	NDE	25/03/2018 8:51 PM	NDE
Urban remnants	9	16	23/03/2016 5:42 PM	NDE	27/10/2017 11:51 AM	NDE
Riparian values	5	6	28/03/2016 1:54 PM	NDE	27/10/2017 11:51 AM	NDE
Scale	1	1	27/10/2017 12:27 PM	NDE	27/10/2017 12:27 PM	NDE
Wildlife corridors	1	3	24/11/2016 2:34 PM	NDE	27/10/2017 11:51 AM	NDE
Other concepts of biodiversity	13	24	2/11/2017 3:46 PM	NDE	2/11/2017 3:54 PM	NDE
Local or community value	13	24	25/03/2016 3:26 PM	NDE	27/10/2017 12:28 PM	NDE
Species diversity	33	303	27/10/2017 12:03 PM	NDE	2/11/2017 3:54 PM	NDE
Common species	2	4	26/02/2016 8:07 PM	NDE	27/10/2017 11:51 AM	NDE
Fauna	6	9	26/02/2016 7:55 PM	NDE	27/10/2017 11:51 AM	NDE
Flora	4	9	30/03/2016 3:52 PM	NDE	27/10/2017 11:51 AM	NDE
Mobile species	2	5	26/02/2016 8:19 PM	NDE	27/10/2017 11:51 AM	NDE
Non-threatened species	1	1	25/11/2016 10:35 AM	NDE	27/10/2017 11:51 AM	NDE
Sedentary species	2	2	26/02/2016 8:20 PM	NDE	27/10/2017 11:51 AM	NDE
Threatened species	33	272	10/02/2016 10:20 AM	NDE	10/01/2018 4:38 PM	NDE
Threatened fauna	19	79	27/10/2017 12:04 PM	NDE	23/10/2018 3:00 AM	NDE
Individual threatened fauna species	19	79	10/01/2018 11:50 AM	NDE	10/01/2018 11:50 AM	NDE
Threatened flora	4	51	17/09/2016 1:56 PM	NDE	23/10/2018 3:00 AM	NDE
Orchids	3	5	30/03/2016 3:52 PM	NDE	23/07/2017 5:59 PM	NDE
Unusual species	1	1	17/09/2016 2:24 PM	NDE	27/10/2017 11:51 AM	NDE
Consistency & integration	30	212	17/06/2017 11:55 AM	NDE	23/10/2018 2:49 AM	NDE
Consistent regs	20	36	7/06/2017 3:06 PM	NDE	23/07/2017 6:03 PM	NDE
Duplication	4	4	21/06/2017 1:12 PM	NDE	23/07/2017 5:52 PM	NDE
Duplication is not as big an issue as people think	1	1	21/06/2017 1:16 PM	NDE	23/07/2017 5:52 PM	NDE
Local government could learn from the FPS & apply some of th	2	2	17/06/2017 11:14 AM	NDE	23/07/2017 5:52 PM	NDE
Local provisions	18	34	12/02/2016 12:27 PM	NDE	23/10/2018 2:31 AM	NDE
Local variation should be limited	1	2	14/06/2017 1:27 PM	NDE	23/10/2018 2:47 AM	NDE
Need integration	12	25	7/06/2017 3:10 PM	NDE	23/07/2017 5:52 PM	NDE
Reg gap	4	5	12/06/2017 12:58 PM	NDE	2/08/2017 3:47 PM	NDE
Regs fragmented	20	40	12/06/2017 12:35 PM	NDE	23/07/2017 5:52 PM	NDE
Inconsistency between regs	19	48	21/06/2017 12:47 PM	NDE	23/07/2017 5:34 PM	NDE
Inconsistency within	17	30	21/06/2017 12:46 PM	NDE	23/07/2017 5:34 PM	NDE
Some better	6	8	14/06/2017 3:14 PM	NDE	23/07/2017 5:52 PM	NDE
Standardised provisions won't result in consistency in interpeta	2	2	14/06/2017 1:09 PM	NDE	23/10/2018 2:41 AM	NDE
State policy gap	7	18	7/06/2017 3:11 PM	NDE	23/07/2017 5:52 PM	NDE



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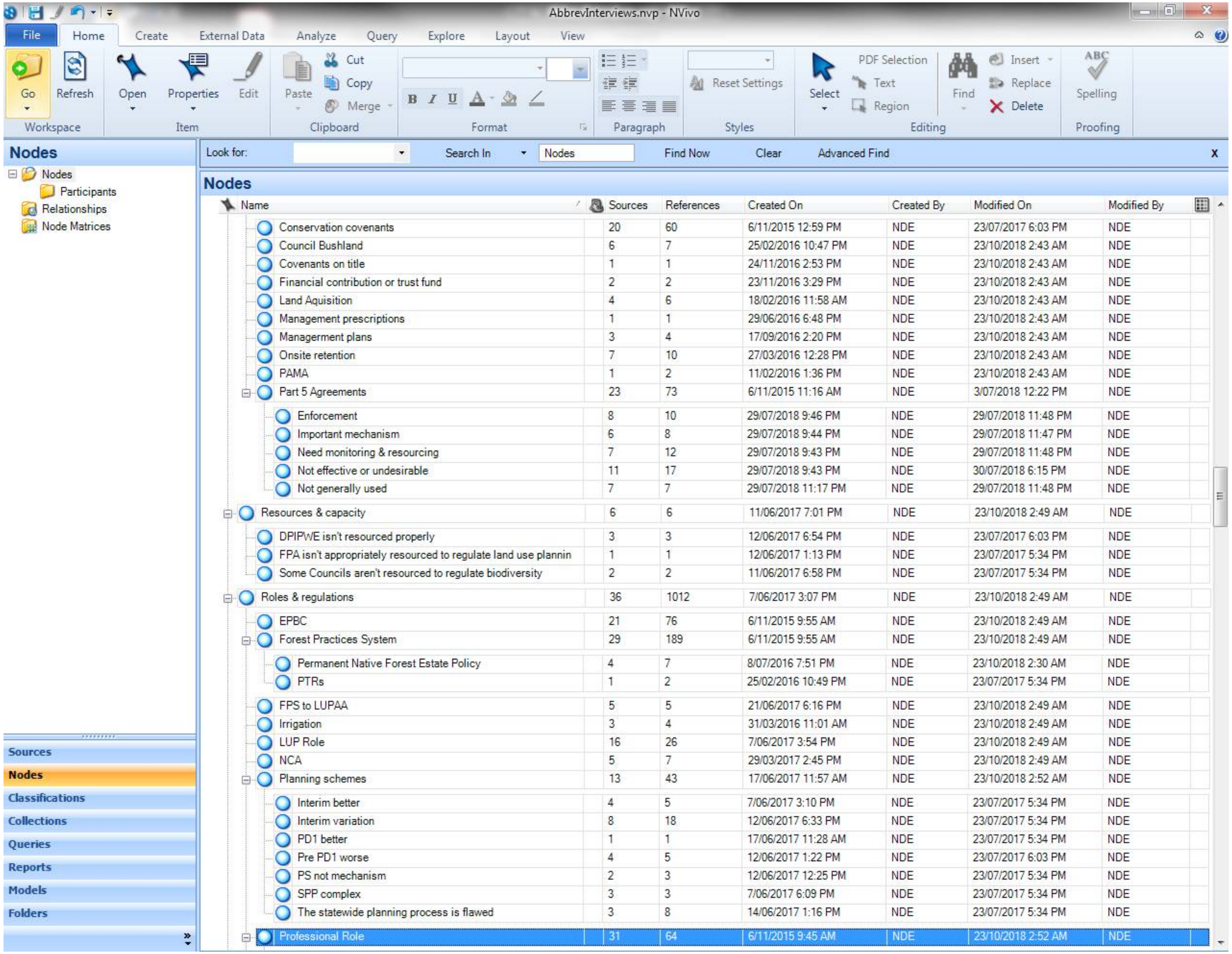
State policy gap	7	18	7/06/2017 3:11 PM	NDE	23/07/2017 5:52 PM	NDE
There should be consistent statewide provisions	13	15	7/06/2017 3:09 PM	NDE	23/07/2017 5:34 PM	NDE
There should be the option of local variation	11	15	7/06/2017 3:13 PM	NDE	6/09/2017 7:24 PM	NDE
Variation ok	4	5	14/06/2017 1:18 PM	NDE	6/09/2017 4:07 PM	NDE
Data, information & mapping	33	167	6/11/2015 10:03 AM	NDE	23/10/2018 2:49 AM	NDE
Decision support tools	25	76	5/02/2016 6:43 PM	NDE	23/07/2017 6:03 PM	NDE
Mapping inaccuracies & inadequacies	11	23	26/08/2016 3:13 PM	NDE	23/07/2017 5:34 PM	NDE
Methodology for mapping	5	15	30/06/2016 12:14 PM	NDE	23/10/2018 2:18 AM	NDE
Threatened flora data	3	12	17/09/2016 3:22 PM	NDE	23/07/2017 5:34 PM	NDE
Issues & concepts	35	785	5/05/2016 10:48 AM	NDE	23/10/2018 2:58 AM	NDE
Development v environment	33	155	6/11/2015 12:41 PM	NDE	23/10/2018 2:38 AM	NDE
Disjunct between objectives & implementation	13	22	27/03/2016 11:19 AM	NDE	23/10/2018 2:38 AM	NDE
ESD	6	10	6/11/2015 10:44 AM	NDE	23/10/2018 2:38 AM	NDE
Precautionary approach or principle	5	9	6/11/2015 11:58 AM	NDE	23/07/2017 5:34 PM	NDE
Procedural integration of biodiversity	17	53	6/11/2015 2:24 PM	NDE	23/07/2017 6:33 PM	NDE
Substantive integration of biodiversity	14	36	6/11/2015 2:25 PM	NDE	23/07/2017 5:34 PM	NDE
Flexibility v certainty	20	82	5/11/2015 5:52 PM	NDE	23/10/2018 2:38 AM	NDE
Head of power	21	95	6/02/2016 2:02 PM	NDE	3/07/2018 12:22 PM	NDE
Legislative review & reform	24	105	19/11/2015 12:44 PM	NDE	3/07/2018 12:22 PM	NDE
Model frameworks	23	97	24/02/2016 8:03 PM	NDE	23/10/2018 2:38 AM	NDE
Perverse outcomes	17	53	27/03/2016 9:16 PM	NDE	23/10/2018 2:38 AM	NDE
Property & or development rights	18	37	6/02/2016 12:18 PM	NDE	23/10/2018 2:38 AM	NDE
Safety v environment	13	16	10/02/2016 11:52 AM	NDE	23/10/2018 2:38 AM	NDE
Shifting knowledge, status, regulations & benchmarks	30	113	5/02/2016 5:09 PM	NDE	23/10/2018 2:38 AM	NDE
Monitoring, compliance and enforcement	27	127	6/11/2015 10:05 AM	NDE	23/10/2018 3:12 AM	NDE
Difficulties of	8	14	14/09/2018 11:51 AM	NDE	14/09/2018 12:34 PM	NDE
Effective	5	8	14/09/2018 12:15 PM	NDE	14/09/2018 12:30 PM	NDE
Examples of	2	3	14/09/2018 11:51 AM	NDE	14/09/2018 12:35 PM	NDE
Importance of	8	9	14/09/2018 11:50 AM	NDE	14/09/2018 12:35 PM	NDE
Lack of	8	9	14/09/2018 11:50 AM	NDE	14/09/2018 12:34 PM	NDE
Monitoring	16	56	6/11/2015 1:00 PM	NDE	23/10/2018 2:49 AM	NDE
Resourcing for	5	6	14/09/2018 11:51 AM	NDE	14/09/2018 12:35 PM	NDE
Protection mechanisms	33	205	6/11/2015 12:59 PM	NDE	23/10/2018 2:49 AM	NDE
Bonds	9	11	17/02/2016 12:52 PM	NDE	23/10/2018 2:43 AM	NDE
Building envelopes	2	3	29/06/2016 6:47 PM	NDE	23/10/2018 2:43 AM	NDE
Compensation	4	8	27/03/2016 12:16 PM	NDE	23/10/2018 2:43 AM	NDE
Conservation covenants	20	60	6/11/2015 12:59 PM	NDE	23/07/2017 6:03 PM	NDE



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Council Bushland	6	7	25/02/2016 10:47 PM	NDE	23/10/2018 2:43 AM	NDE
Covenants on title	1	1	24/11/2016 2:53 PM	NDE	23/10/2018 2:43 AM	NDE
Financial contribution or trust fund	2	2	23/11/2016 3:29 PM	NDE	23/10/2018 2:43 AM	NDE
Land Aquisition	4	6	18/02/2016 11:58 AM	NDE	23/10/2018 2:43 AM	NDE
Management prescriptions	1	1	29/06/2016 6:48 PM	NDE	23/10/2018 2:43 AM	NDE
Managerment plans	3	4	17/09/2016 2:20 PM	NDE	23/10/2018 2:43 AM	NDE
Onsite retention	7	10	27/03/2016 12:28 PM	NDE	23/10/2018 2:43 AM	NDE
PAMA	1	2	11/02/2016 1:36 PM	NDE	23/10/2018 2:43 AM	NDE
Part 5 Agreements	23	73	6/11/2015 11:16 AM	NDE	3/07/2018 12:22 PM	NDE
Enforcement	8	10	29/07/2018 9:46 PM	NDE	29/07/2018 11:48 PM	NDE
Important mechanism	6	8	29/07/2018 9:44 PM	NDE	29/07/2018 11:47 PM	NDE
Need monitoring & resourcing	7	12	29/07/2018 9:43 PM	NDE	29/07/2018 11:48 PM	NDE
Not effective or undesirable	11	17	29/07/2018 9:43 PM	NDE	30/07/2018 6:15 PM	NDE
Not generally used	7	7	29/07/2018 11:17 PM	NDE	29/07/2018 11:48 PM	NDE
Resources & capacity	6	6	11/06/2017 7:01 PM	NDE	23/10/2018 2:49 AM	NDE
DPIPWE isn't resourced properly	3	3	12/06/2017 6:54 PM	NDE	23/07/2017 6:03 PM	NDE
FPA isn't appropriately resourced to regulate land use plannin	1	1	12/06/2017 1:13 PM	NDE	23/07/2017 5:34 PM	NDE
Some Councils aren't resourced to regulate biodiversity	2	2	11/06/2017 6:58 PM	NDE	23/07/2017 5:34 PM	NDE
Roles & regulations	36	1012	7/06/2017 3:07 PM	NDE	23/10/2018 2:49 AM	NDE
EPBC	21	76	6/11/2015 9:55 AM	NDE	23/10/2018 2:49 AM	NDE
Forest Practices System	29	189	6/11/2015 9:55 AM	NDE	23/10/2018 2:49 AM	NDE
Permanent Native Forest Estate Policy	4	7	8/07/2016 7:51 PM	NDE	23/10/2018 2:30 AM	NDE
PTRs	1	2	25/02/2016 10:49 PM	NDE	23/07/2017 5:34 PM	NDE
FPS to LUPAA	5	5	21/06/2017 6:16 PM	NDE	23/10/2018 2:49 AM	NDE
Irrigation	3	4	31/03/2016 11:01 AM	NDE	23/10/2018 2:49 AM	NDE
LUP Role	16	26	7/06/2017 3:54 PM	NDE	23/10/2018 2:49 AM	NDE
NCA	5	7	29/03/2017 2:45 PM	NDE	23/10/2018 2:49 AM	NDE
Planning schemes	13	43	17/06/2017 11:57 AM	NDE	23/10/2018 2:52 AM	NDE
Interim better	4	5	7/06/2017 3:10 PM	NDE	23/07/2017 5:34 PM	NDE
Interim variation	8	18	12/06/2017 6:33 PM	NDE	23/07/2017 5:34 PM	NDE
PD1 better	1	1	17/06/2017 11:28 AM	NDE	23/07/2017 5:34 PM	NDE
Pre PD1 worse	4	5	12/06/2017 1:22 PM	NDE	23/07/2017 6:03 PM	NDE
PS not mechanism	2	3	12/06/2017 12:25 PM	NDE	23/07/2017 5:34 PM	NDE
SPP complex	3	3	7/06/2017 6:09 PM	NDE	23/07/2017 5:34 PM	NDE
The statewide planning process is flawed	3	8	14/06/2017 1:16 PM	NDE	23/07/2017 5:34 PM	NDE
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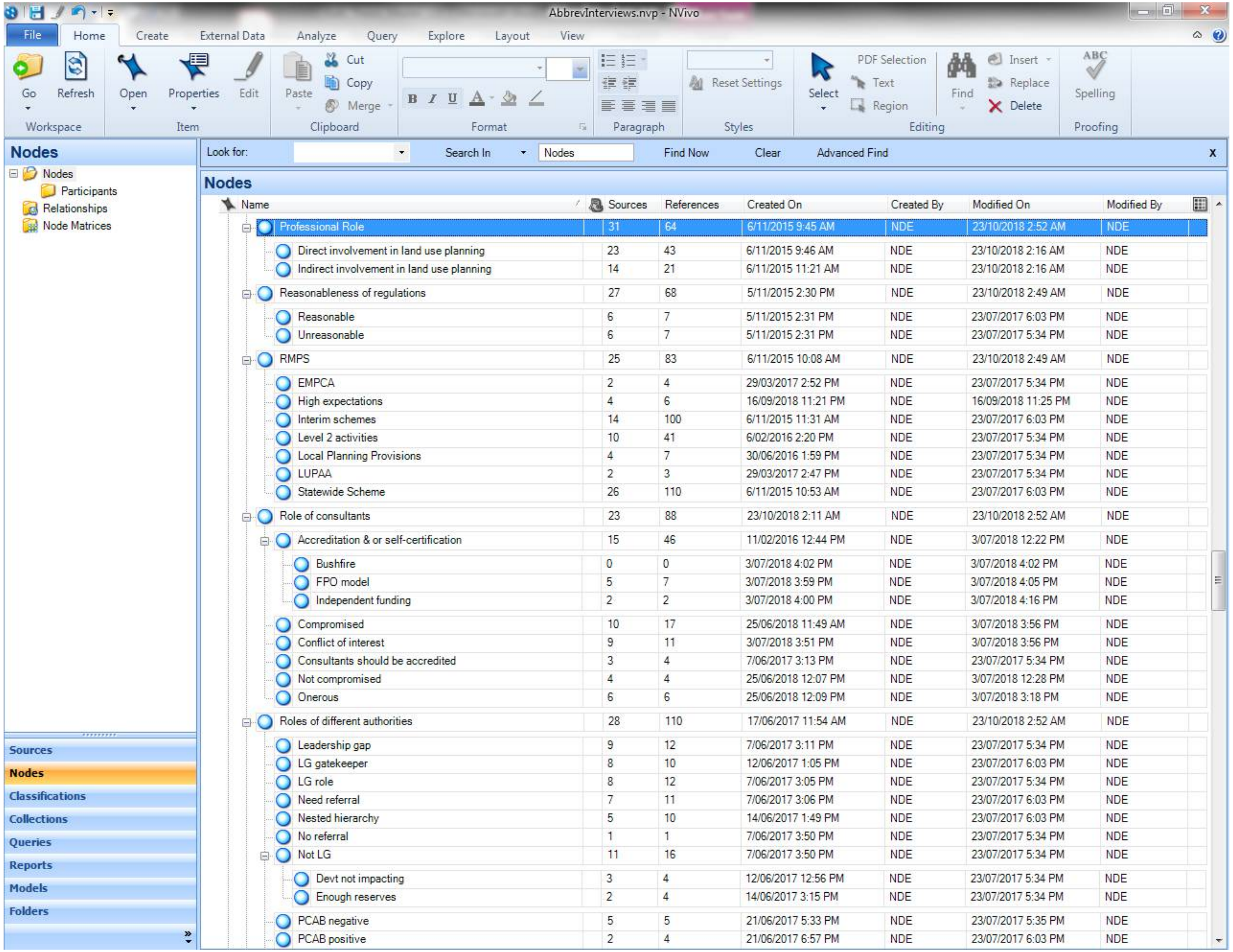

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Direct involvement in land use planning	23	43	6/11/2015 9:46 AM	NDE	23/10/2018 2:16 AM	NDE
Indirect involvement in land use planning	14	21	6/11/2015 11:21 AM	NDE	23/10/2018 2:16 AM	NDE
Reasonableness of regulations	27	68	5/11/2015 2:30 PM	NDE	23/10/2018 2:49 AM	NDE
Reasonable	6	7	5/11/2015 2:31 PM	NDE	23/07/2017 6:03 PM	NDE
Unreasonable	6	7	5/11/2015 2:31 PM	NDE	23/07/2017 5:34 PM	NDE
RMPS	25	83	6/11/2015 10:08 AM	NDE	23/10/2018 2:49 AM	NDE
EMPCA	2	4	29/03/2017 2:52 PM	NDE	23/07/2017 5:34 PM	NDE
High expectations	4	6	16/09/2018 11:21 PM	NDE	16/09/2018 11:25 PM	NDE
Interim schemes	14	100	6/11/2015 11:31 AM	NDE	23/07/2017 6:03 PM	NDE
Level 2 activities	10	41	6/02/2016 2:20 PM	NDE	23/07/2017 5:34 PM	NDE
Local Planning Provisions	4	7	30/06/2016 1:59 PM	NDE	23/07/2017 5:34 PM	NDE
LUPAA	2	3	29/03/2017 2:47 PM	NDE	23/07/2017 5:34 PM	NDE
Statewide Scheme	26	110	6/11/2015 10:53 AM	NDE	23/07/2017 6:03 PM	NDE
Role of consultants	23	88	23/10/2018 2:11 AM	NDE	23/10/2018 2:52 AM	NDE
Accreditation & or self-certification	15	46	11/02/2016 12:44 PM	NDE	3/07/2018 12:22 PM	NDE
Bushfire	0	0	3/07/2018 4:02 PM	NDE	3/07/2018 4:02 PM	NDE
FPO model	5	7	3/07/2018 3:59 PM	NDE	3/07/2018 4:05 PM	NDE
Independent funding	2	2	3/07/2018 4:00 PM	NDE	3/07/2018 4:16 PM	NDE
Compromised	10	17	25/06/2018 11:49 AM	NDE	3/07/2018 3:56 PM	NDE
Conflict of interest	9	11	3/07/2018 3:51 PM	NDE	3/07/2018 3:56 PM	NDE
Consultants should be accredited	3	4	7/06/2017 3:13 PM	NDE	23/07/2017 5:34 PM	NDE
Not compromised	4	4	25/06/2018 12:07 PM	NDE	3/07/2018 12:28 PM	NDE
Onerous	6	6	25/06/2018 12:09 PM	NDE	3/07/2018 3:18 PM	NDE
Roles of different authorities	28	110	17/06/2017 11:54 AM	NDE	23/10/2018 2:52 AM	NDE
Leadership gap	9	12	7/06/2017 3:11 PM	NDE	23/07/2017 5:34 PM	NDE
LG gatekeeper	8	10	12/06/2017 1:05 PM	NDE	23/07/2017 6:03 PM	NDE
LG role	8	12	7/06/2017 3:05 PM	NDE	23/07/2017 5:34 PM	NDE
Need referral	7	11	7/06/2017 3:06 PM	NDE	23/07/2017 6:03 PM	NDE
Nested hierarchy	5	10	14/06/2017 1:49 PM	NDE	23/07/2017 6:03 PM	NDE
No referral	1	1	7/06/2017 3:50 PM	NDE	23/07/2017 5:34 PM	NDE
Not LG	11	16	7/06/2017 3:50 PM	NDE	23/07/2017 5:34 PM	NDE
Devt not impacting	3	4	12/06/2017 12:56 PM	NDE	23/07/2017 5:34 PM	NDE
Enough reserves	2	4	14/06/2017 3:15 PM	NDE	23/07/2017 5:34 PM	NDE
PCAB negative	5	5	21/06/2017 5:33 PM	NDE	23/07/2017 5:35 PM	NDE
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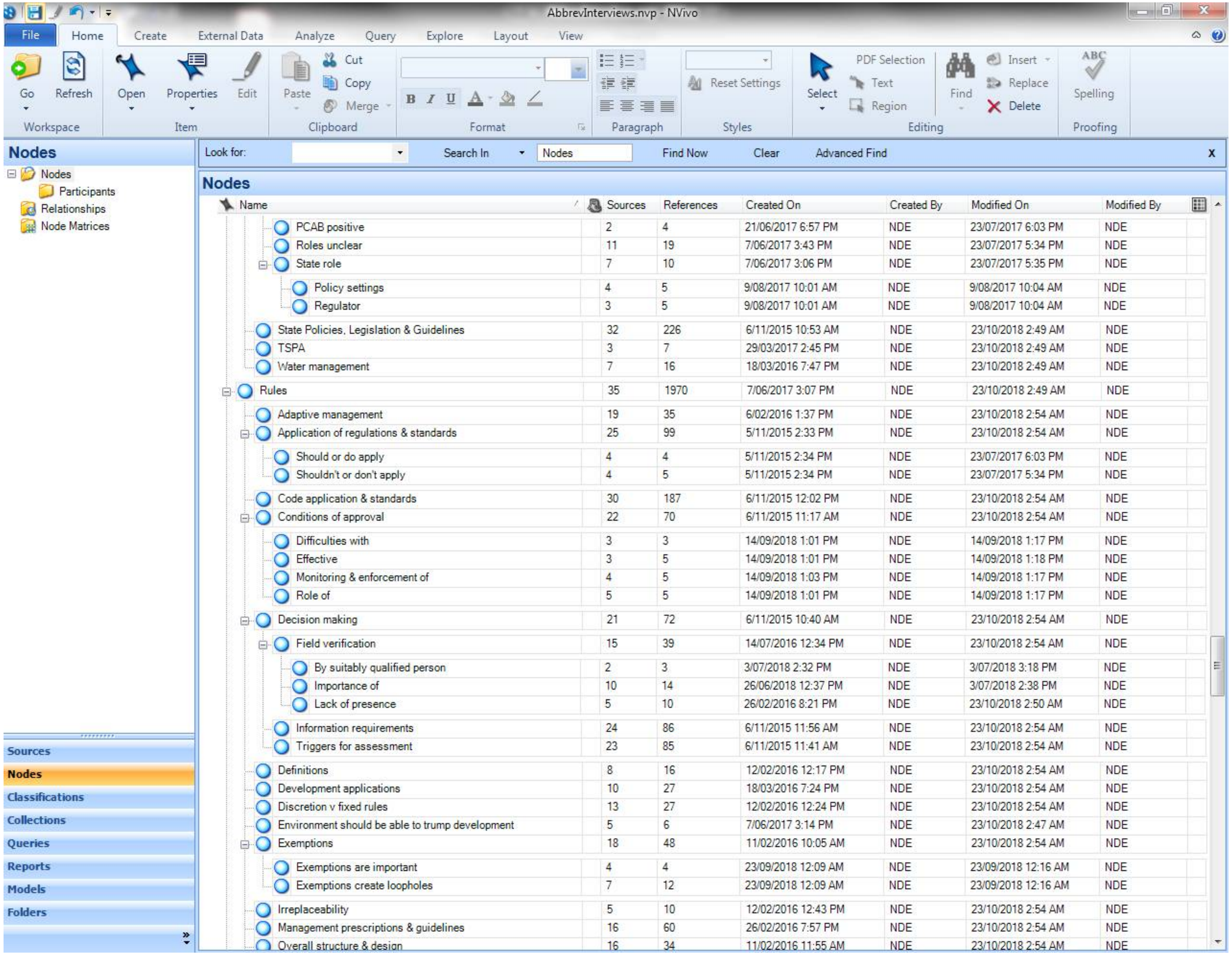

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State role	7	10	7/06/2017 3:06 PM	NDE	23/07/2017 5:35 PM	NDE
Policy settings	4	5	9/08/2017 10:01 AM	NDE	9/08/2017 10:04 AM	NDE
Regulator	3	5	9/08/2017 10:01 AM	NDE	9/08/2017 10:04 AM	NDE
State Policies, Legislation & Guidelines	32	226	6/11/2015 10:53 AM	NDE	23/10/2018 2:49 AM	NDE
TSPA	3	7	29/03/2017 2:45 PM	NDE	23/10/2018 2:49 AM	NDE
Water management	7	16	18/03/2016 7:47 PM	NDE	23/10/2018 2:49 AM	NDE
Rules	35	1970	7/06/2017 3:07 PM	NDE	23/10/2018 2:49 AM	NDE
Adaptive management	19	35	6/02/2016 1:37 PM	NDE	23/10/2018 2:54 AM	NDE
Application of regulations & standards	25	99	5/11/2015 2:33 PM	NDE	23/10/2018 2:54 AM	NDE
Should or do apply	4	4	5/11/2015 2:34 PM	NDE	23/07/2017 6:03 PM	NDE
Shouldn't or don't apply	4	5	5/11/2015 2:34 PM	NDE	23/07/2017 5:34 PM	NDE
Code application & standards	30	187	6/11/2015 12:02 PM	NDE	23/10/2018 2:54 AM	NDE
Conditions of approval	22	70	6/11/2015 11:17 AM	NDE	23/10/2018 2:54 AM	NDE
Difficulties with	3	3	14/09/2018 1:01 PM	NDE	14/09/2018 1:17 PM	NDE
Effective	3	5	14/09/2018 1:01 PM	NDE	14/09/2018 1:18 PM	NDE
Monitoring & enforcement of	4	5	14/09/2018 1:03 PM	NDE	14/09/2018 1:17 PM	NDE
Role of	5	5	14/09/2018 1:01 PM	NDE	14/09/2018 1:17 PM	NDE
Decision making	21	72	6/11/2015 10:40 AM	NDE	23/10/2018 2:54 AM	NDE
Field verification	15	39	14/07/2016 12:34 PM	NDE	23/10/2018 2:54 AM	NDE
By suitably qualified person	2	3	3/07/2018 2:32 PM	NDE	3/07/2018 3:18 PM	NDE
Importance of	10	14	26/06/2018 12:37 PM	NDE	3/07/2018 2:38 PM	NDE
Lack of presence	5	10	26/02/2016 8:21 PM	NDE	23/10/2018 2:50 AM	NDE
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Triggers for assessment	23	85	6/11/2015 11:41 AM	NDE	23/10/2018 2:54 AM	NDE
Definitions	8	16	12/02/2016 12:17 PM	NDE	23/10/2018 2:54 AM	NDE
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Discretion v fixed rules	13	27	12/02/2016 12:24 PM	NDE	23/10/2018 2:54 AM	NDE
Environment should be able to trump development	5	6	7/06/2017 3:14 PM	NDE	23/10/2018 2:47 AM	NDE
Exemptions	18	48	11/02/2016 10:05 AM	NDE	23/10/2018 2:54 AM	NDE
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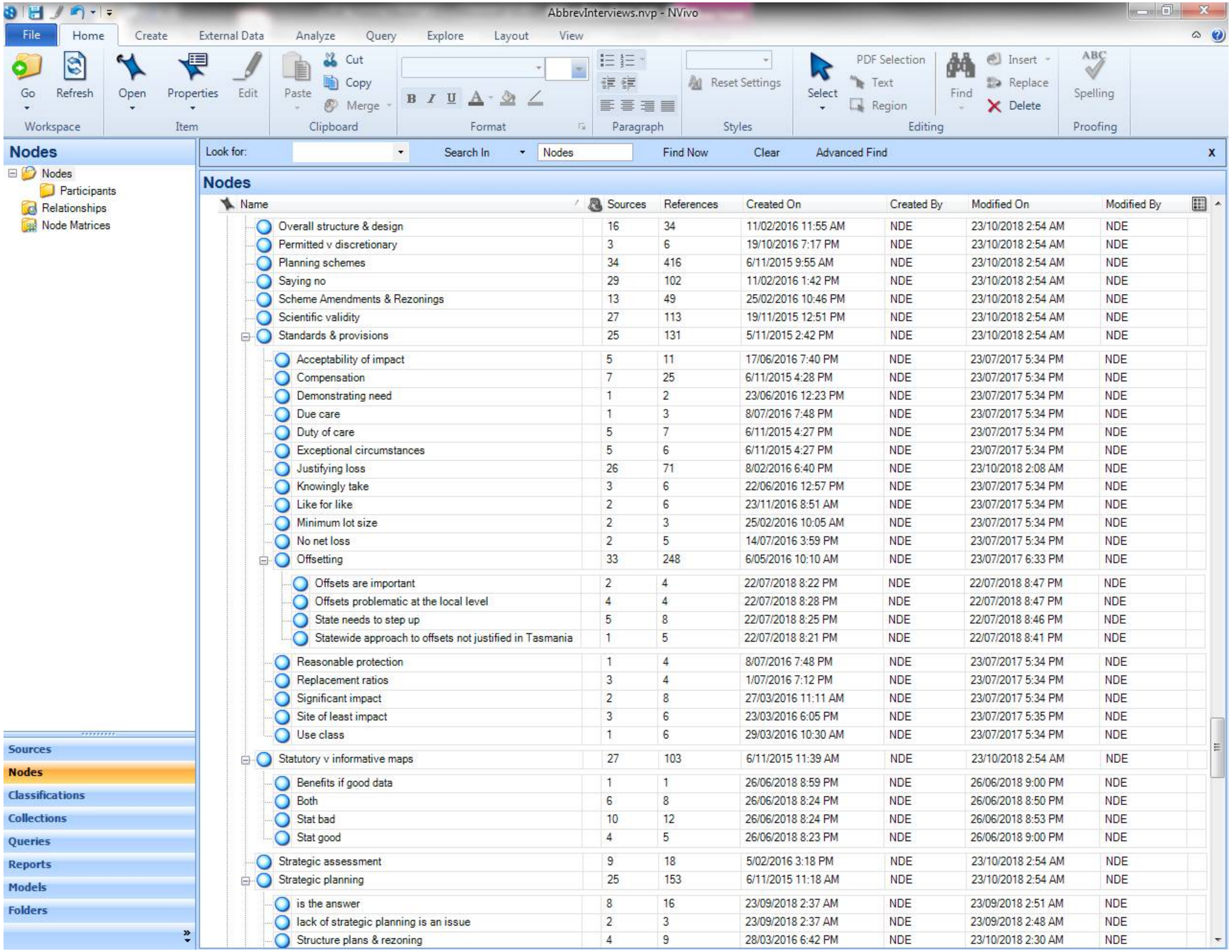
Exemptions create loopholes	7	12	23/09/2018 12:09 AM	NDE	23/09/2018 12:16 AM	NDE
Irreplaceability	5	10	12/02/2016 12:43 PM	NDE	23/10/2018 2:54 AM	NDE
Management prescriptions & guidelines	16	60	26/02/2016 7:57 PM	NDE	23/10/2018 2:54 AM	NDE
Overall structure & design	16	34	11/02/2016 11:55 AM	NDE	23/10/2018 2:54 AM	NDE



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Planning schemes	34	416	6/11/2015 9:55 AM	NDE	23/10/2018 2:54 AM	NDE
Saying no	29	102	11/02/2016 1:42 PM	NDE	23/10/2018 2:54 AM	NDE
Scheme Amendments & Rezonings	13	49	25/02/2016 10:46 PM	NDE	23/10/2018 2:54 AM	NDE
Scientific validity	27	113	19/11/2015 12:51 PM	NDE	23/10/2018 2:54 AM	NDE
Standards & provisions	25	131	5/11/2015 2:42 PM	NDE	23/10/2018 2:54 AM	NDE
Acceptability of impact	5	11	17/06/2016 7:40 PM	NDE	23/07/2017 5:34 PM	NDE
Compensation	7	25	6/11/2015 4:28 PM	NDE	23/07/2017 5:34 PM	NDE
Demonstrating need	1	2	23/06/2016 12:23 PM	NDE	23/07/2017 5:34 PM	NDE
Due care	1	3	8/07/2016 7:48 PM	NDE	23/07/2017 5:34 PM	NDE
Duty of care	5	7	6/11/2015 4:27 PM	NDE	23/07/2017 5:34 PM	NDE
Exceptional circumstances	5	6	6/11/2015 4:27 PM	NDE	23/07/2017 5:34 PM	NDE
Justifying loss	26	71	8/02/2016 6:40 PM	NDE	23/10/2018 2:08 AM	NDE
Knowingly take	3	6	22/06/2016 12:57 PM	NDE	23/07/2017 5:34 PM	NDE
Like for like	2	6	23/11/2016 8:51 AM	NDE	23/07/2017 5:34 PM	NDE
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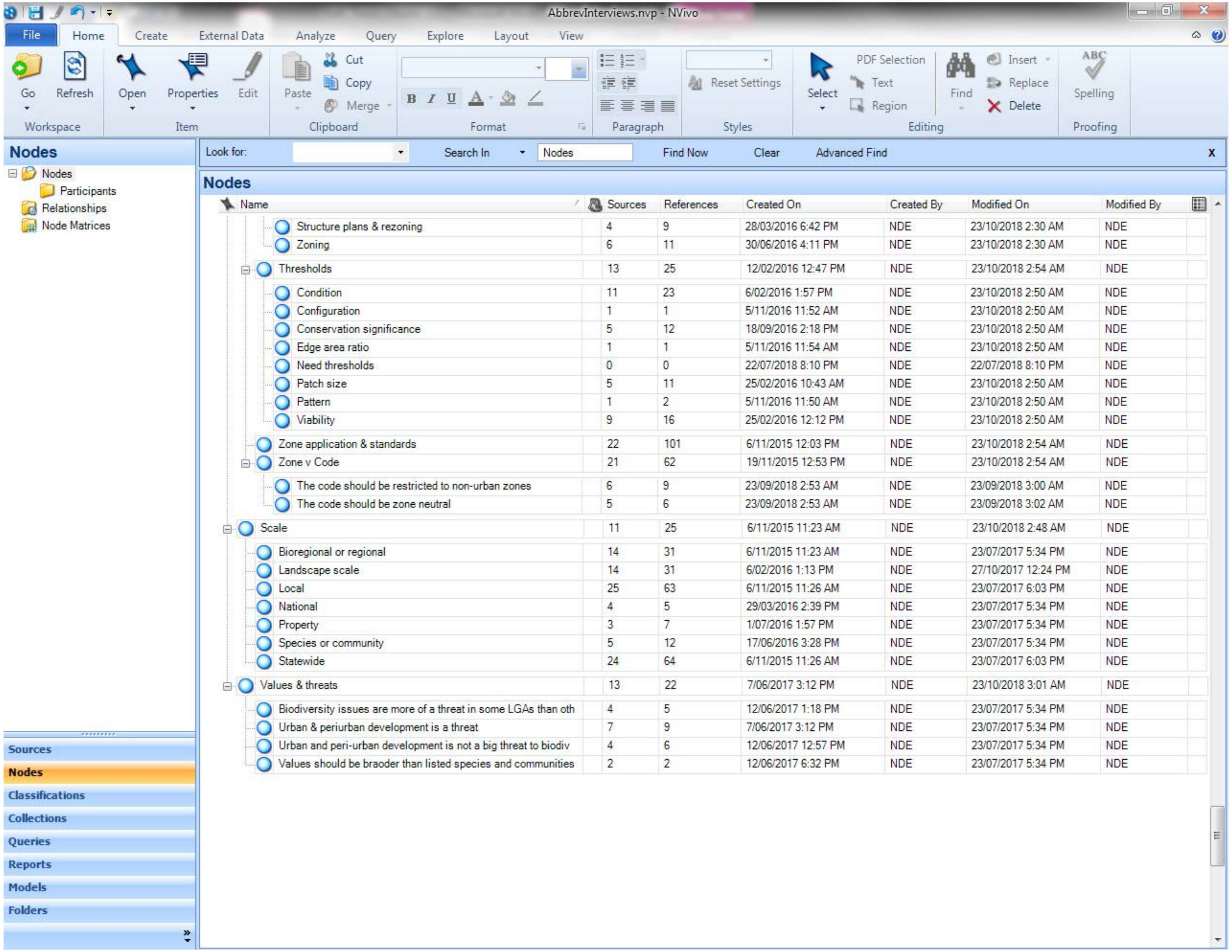
Offsets are important	2	4	22/07/2018 8:22 PM	NDE	22/07/2018 8:47 PM	NDE
Offsets problematic at the local level	4	4	22/07/2018 8:28 PM	NDE	22/07/2018 8:47 PM	NDE
State needs to step up	5	8	22/07/2018 8:25 PM	NDE	22/07/2018 8:46 PM	NDE
Statewide approach to offsets not justified in Tasmania	1	5	22/07/2018 8:21 PM	NDE	22/07/2018 8:41 PM	NDE
Reasonable protection	1	4	8/07/2016 7:48 PM	NDE	23/07/2017 5:34 PM	NDE
Replacement ratios	3	4	1/07/2016 7:12 PM	NDE	23/07/2017 5:34 PM	NDE
Significant impact	2	8	27/03/2016 11:11 AM	NDE	23/07/2017 5:34 PM	NDE
Site of least impact	3	6	23/03/2016 6:05 PM	NDE	23/07/2017 5:35 PM	NDE
Use class	1	6	29/03/2016 10:30 AM	NDE	23/07/2017 5:34 PM	NDE
Statutory v informative maps	27	103	6/11/2015 11:39 AM	NDE	23/10/2018 2:54 AM	NDE
Benefits if good data	1	1	26/06/2018 8:59 PM	NDE	26/06/2018 9:00 PM	NDE
Both	6	8	26/06/2018 8:24 PM	NDE	26/06/2018 8:50 PM	NDE
Stat bad	10	12	26/06/2018 8:24 PM	NDE	26/06/2018 8:53 PM	NDE
Stat good	4	5	26/06/2018 8:23 PM	NDE	26/06/2018 9:00 PM	NDE
Strategic assessment	9	18	5/02/2016 3:18 PM	NDE	23/10/2018 2:54 AM	NDE
Strategic planning	25	153	6/11/2015 11:18 AM	NDE	23/10/2018 2:54 AM	NDE
is the answer	8	16	23/09/2018 2:37 AM	NDE	23/09/2018 2:51 AM	NDE
lack of strategic planning is an issue	2	3	23/09/2018 2:37 AM	NDE	23/09/2018 2:48 AM	NDE
Structure plans & rezoning	4	9	28/03/2016 6:42 PM	NDE	23/10/2018 2:30 AM	NDE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Workspace Item Clipboard Format Paragraph Styles Editing Proofing
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Nodes
Nodes
Participants
Relationships
Node Matrices
Look for: Search In Nodes Find Now Clear Advanced Find
Name Sources References Created On Created By Modified On Modified By
Structure plans & rezoning 4 9 28/03/2016 6:42 PM NDE 23/10/2018 2:30 AM NDE
Zoning 6 11 30/06/2016 4:11 PM NDE 23/10/2018 2:30 AM NDE
Thresholds 13 25 12/02/2016 12:47 PM NDE 23/10/2018 2:54 AM NDE
Condition 11 23 6/02/2016 1:57 PM NDE 23/10/2018 2:50 AM NDE
Configuration 1 1 5/11/2016 11:52 AM NDE 23/10/2018 2:50 AM NDE
Conservation significance 5 12 18/09/2016 2:18 PM NDE 23/10/2018 2:50 AM NDE
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Need thresholds 0 0 22/07/2018 8:10 PM NDE 22/07/2018 8:10 PM NDE
Patch size 5 11 25/02/2016 10:43 AM NDE 23/10/2018 2:50 AM NDE
Pattern 1 2 5/11/2016 11:50 AM NDE 23/10/2018 2:50 AM NDE
Viability 9 16 25/02/2016 12:12 PM NDE 23/10/2018 2:50 AM NDE
Zone application & standards 22 101 6/11/2015 12:03 PM NDE 23/10/2018 2:54 AM NDE
Zone v Code 21 62 19/11/2015 12:53 PM NDE 23/10/2018 2:54 AM NDE
The code should be restricted to non-urban zones 6 9 23/09/2018 2:53 AM NDE 23/09/2018 3:00 AM NDE
The code should be zone neutral 5 6 23/09/2018 2:53 AM NDE 23/09/2018 3:02 AM NDE
Scale 11 25 6/11/2015 11:23 AM NDE 23/10/2018 2:48 AM NDE
Bioregional or regional 14 31 6/11/2015 11:23 AM NDE 23/07/2017 5:34 PM NDE
Landscape scale 14 31 6/02/2016 1:13 PM NDE 27/10/2017 12:24 PM NDE
Local 25 63 6/11/2015 11:26 AM NDE 23/07/2017 6:03 PM NDE
National 4 5 29/03/2016 2:39 PM NDE 23/07/2017 5:34 PM NDE
Property 3 7 1/07/2016 1:57 PM NDE 23/07/2017 5:34 PM NDE
Species or community 5 12 17/06/2016 3:28 PM NDE 23/07/2017 5:34 PM NDE
Statewide 24 64 6/11/2015 11:26 AM NDE 23/07/2017 6:03 PM NDE
Values & threats 13 22 7/06/2017 3:12 PM NDE 23/10/2018 3:01 AM NDE
Biodiversity issues are more of a threat in some LGAs than oth 4 5 12/06/2017 1:18 PM NDE 23/07/2017 5:34 PM NDE
Urban & periurban development is a threat 7 9 7/06/2017 3:12 PM NDE 23/07/2017 5:34 PM NDE
Urban and peri-urban development is not a big threat to biodiv 4 6 12/06/2017 12:57 PM NDE 23/07/2017 5:34 PM NDE
Values should be broader than listed species and communities 2 2 12/06/2017 6:32 PM NDE 23/07/2017 5:34 PM NDE
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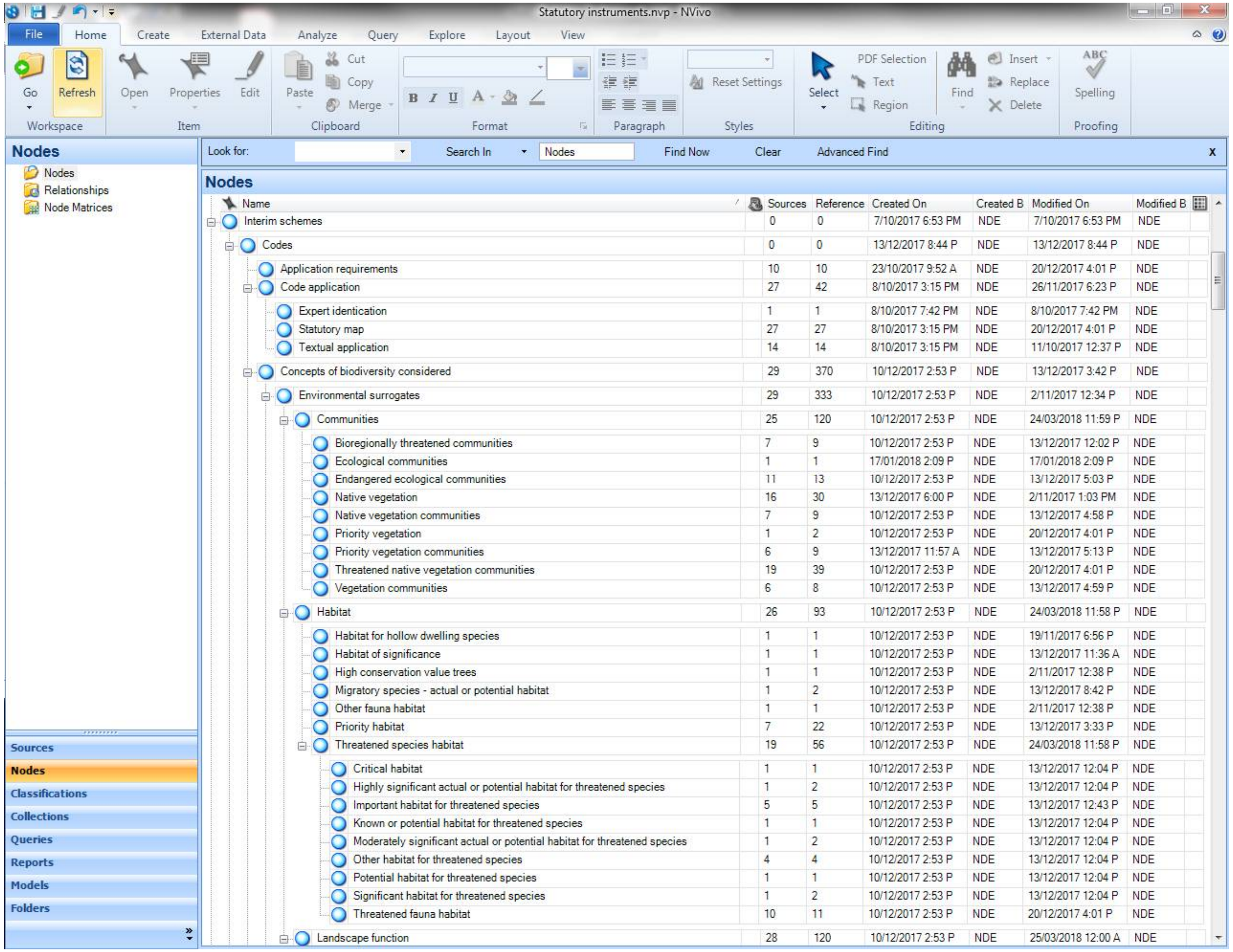
Appendix VI – Planning scheme content analysis coding



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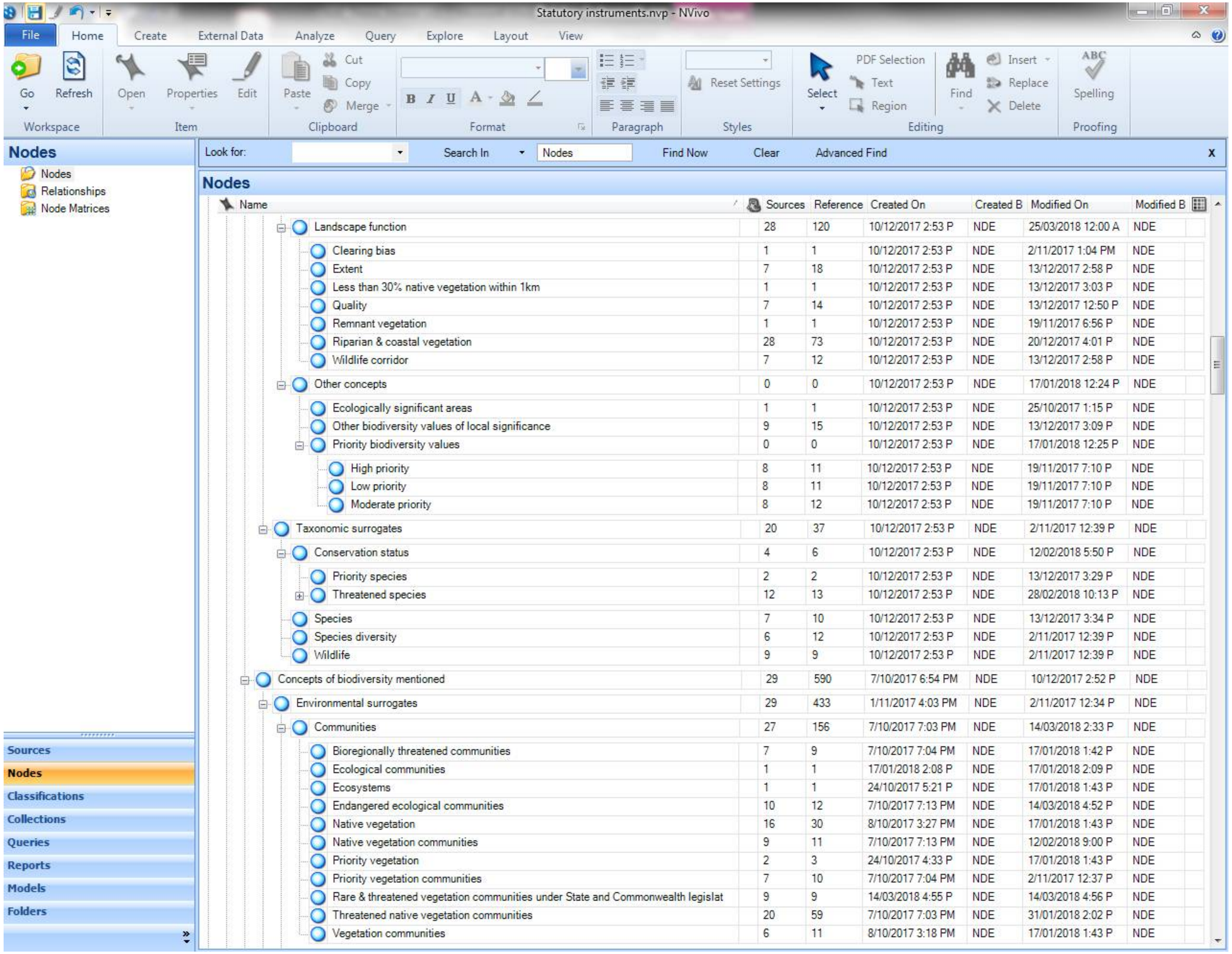
Bioregionally threatened communities	7	9	10/12/2017 2:53 P	NDE	13/12/2017 12:02 P	NDE
Ecological communities	1	1	17/01/2018 2:09 P	NDE	17/01/2018 2:09 P	NDE
Endangered ecological communities	11	13	10/12/2017 2:53 P	NDE	13/12/2017 5:03 P	NDE
Native vegetation	16	30	13/12/2017 6:00 P	NDE	2/11/2017 1:03 PM	NDE
Native vegetation communities	7	9	10/12/2017 2:53 P	NDE	13/12/2017 4:58 P	NDE
Priority vegetation	1	2	10/12/2017 2:53 P	NDE	20/12/2017 4:01 P	NDE
Priority vegetation communities	6	9	13/12/2017 11:57 A	NDE	13/12/2017 5:13 P	NDE
Threatened native vegetation communities	19	39	10/12/2017 2:53 P	NDE	20/12/2017 4:01 P	NDE
Vegetation communities	6	8	10/12/2017 2:53 P	NDE	13/12/2017 4:59 P	NDE
Habitat	26	93	10/12/2017 2:53 P	NDE	24/03/2018 11:58 P	NDE
Habitat for hollow dwelling species	1	1	10/12/2017 2:53 P	NDE	19/11/2017 6:56 P	NDE
Habitat of significance	1	1	10/12/2017 2:53 P	NDE	13/12/2017 11:36 A	NDE
High conservation value trees	1	1	10/12/2017 2:53 P	NDE	2/11/2017 12:38 P	NDE
Migratory species - actual or potential habitat	1	2	10/12/2017 2:53 P	NDE	13/12/2017 8:42 P	NDE
Other fauna habitat	1	1	10/12/2017 2:53 P	NDE	2/11/2017 12:38 P	NDE
Priority habitat	7	22	10/12/2017 2:53 P	NDE	13/12/2017 3:33 P	NDE
Threatened species habitat	19	56	10/12/2017 2:53 P	NDE	24/03/2018 11:58 P	NDE
Critical habitat	1	1	10/12/2017 2:53 P	NDE	13/12/2017 12:04 P	NDE
Highly significant actual or potential habitat for threatened species	1	2	10/12/2017 2:53 P	NDE	13/12/2017 12:04 P	NDE
Important habitat for threatened species	5	5	10/12/2017 2:53 P	NDE	13/12/2017 12:43 P	NDE
Known or potential habitat for threatened species	1	1	10/12/2017 2:53 P	NDE	13/12/2017 12:04 P	NDE
Moderately significant actual or potential habitat for threatened species	1	2	10/12/2017 2:53 P	NDE	13/12/2017 12:04 P	NDE
Other habitat for threatened species	4	4	10/12/2017 2:53 P	NDE	13/12/2017 12:04 P	NDE
Potential habitat for threatened species	1	1	10/12/2017 2:53 P	NDE	13/12/2017 12:04 P	NDE
Significant habitat for threatened species	1	2	10/12/2017 2:53 P	NDE	13/12/2017 12:04 P	NDE
Threatened fauna habitat	10	11	10/12/2017 2:53 P	NDE	20/12/2017 4:01 P	NDE
Landscape function	28	120	10/12/2017 2:53 P	NDE	25/03/2018 12:00 A	NDE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Nodes
Nodes
Relationships
Node Matrices
Look for: Search In Nodes Find Now Clear Advanced Find
Nodes
Name Sources Reference Created On Created B Modified On Modified B
Landscape function 28 120 10/12/2017 2:53 P NDE 25/03/2018 12:00 A NDE
Clearing bias 1 1 10/12/2017 2:53 P NDE 2/11/2017 1:04 PM NDE
Extent 7 18 10/12/2017 2:53 P NDE 13/12/2017 2:58 P NDE
Less than 30% native vegetation within 1km 1 1 10/12/2017 2:53 P NDE 13/12/2017 3:03 P NDE
Quality 7 14 10/12/2017 2:53 P NDE 13/12/2017 12:50 P NDE
Remnant vegetation 1 1 10/12/2017 2:53 P NDE 19/11/2017 6:56 P NDE
Riparian & coastal vegetation 28 73 10/12/2017 2:53 P NDE 20/12/2017 4:01 P NDE
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Other concepts 0 0 10/12/2017 2:53 P NDE 17/01/2018 12:24 P NDE
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High priority 8 11 10/12/2017 2:53 P NDE 19/11/2017 7:10 P NDE
Low priority 8 11 10/12/2017 2:53 P NDE 19/11/2017 7:10 P NDE
Moderate priority 8 12 10/12/2017 2:53 P NDE 19/11/2017 7:10 P NDE
Taxonomic surrogates 20 37 10/12/2017 2:53 P NDE 2/11/2017 12:39 P NDE
Conservation status 4 6 10/12/2017 2:53 P NDE 12/02/2018 5:50 P NDE
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Threatened species 12 13 10/12/2017 2:53 P NDE 28/02/2018 10:13 P NDE
Species 7 10 10/12/2017 2:53 P NDE 13/12/2017 3:34 P NDE
Species diversity 6 12 10/12/2017 2:53 P NDE 2/11/2017 12:39 P NDE
Wildlife 9 9 10/12/2017 2:53 P NDE 2/11/2017 12:39 P NDE
Concepts of biodiversity mentioned 29 590 7/10/2017 6:54 PM NDE 10/12/2017 2:52 P NDE
Environmental surrogates 29 433 1/11/2017 4:03 PM NDE 2/11/2017 12:34 P NDE
Communities 27 156 7/10/2017 7:03 PM NDE 14/03/2018 2:33 P NDE
Bioregionally threatened communities 7 9 7/10/2017 7:04 PM NDE 17/01/2018 1:42 P NDE
Ecological communities 1 1 17/01/2018 2:08 P NDE 17/01/2018 2:09 P NDE
Ecosystems 1 1 24/10/2017 5:21 P NDE 17/01/2018 1:43 P NDE
Endangered ecological communities 10 12 7/10/2017 7:13 PM NDE 14/03/2018 4:52 P NDE
Native vegetation 16 30 8/10/2017 3:27 PM NDE 17/01/2018 1:43 P NDE
Native vegetation communities 9 11 7/10/2017 7:13 PM NDE 12/02/2018 9:00 P NDE
Priority vegetation 2 3 24/10/2017 4:33 P NDE 17/01/2018 1:43 P NDE
Priority vegetation communities 7 10 7/10/2017 7:04 PM NDE 2/11/2017 12:37 P NDE
Rare & threatened vegetation communities under State and Commonwealth legislat 9 9 14/03/2018 4:55 P NDE 14/03/2018 4:56 P NDE
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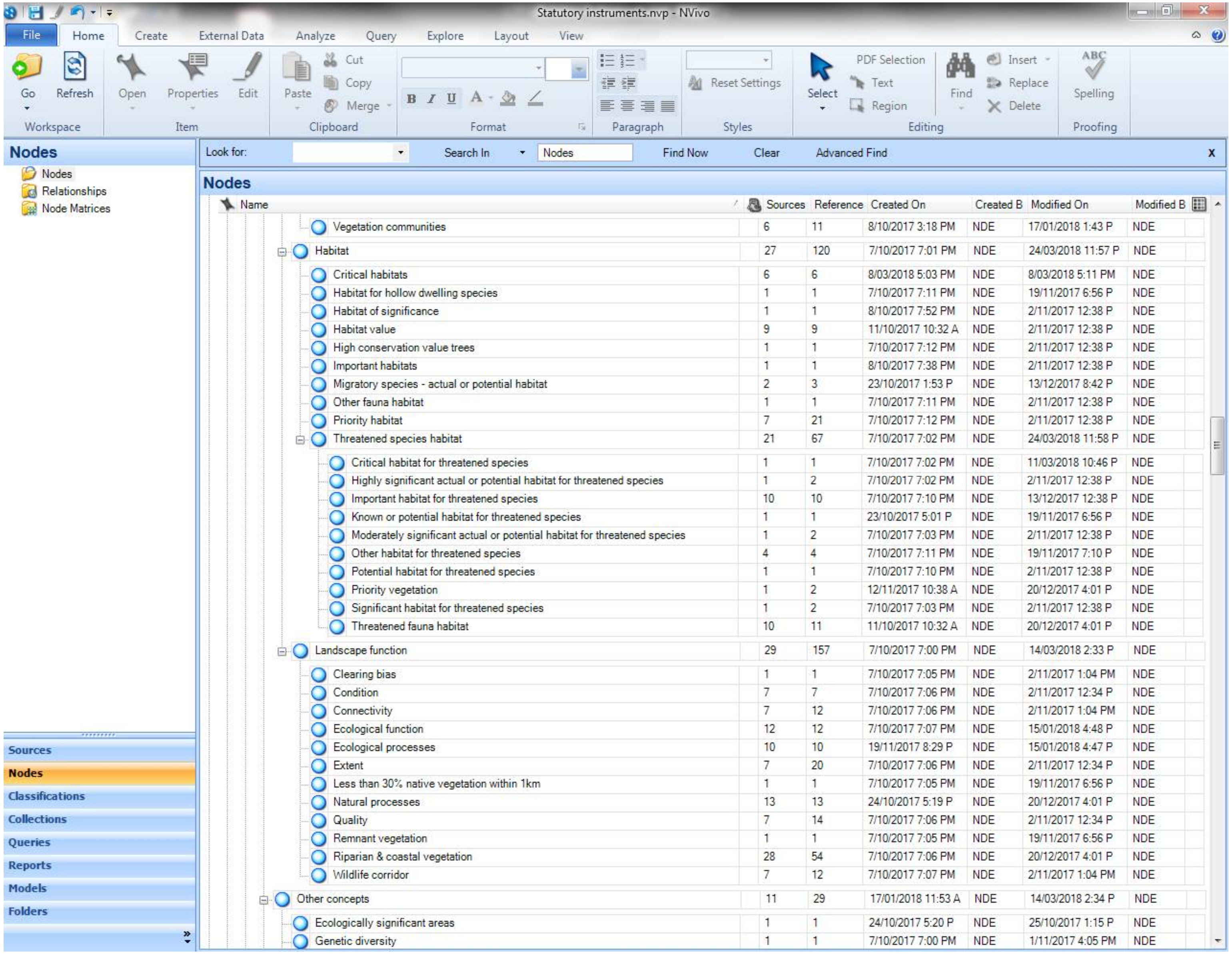

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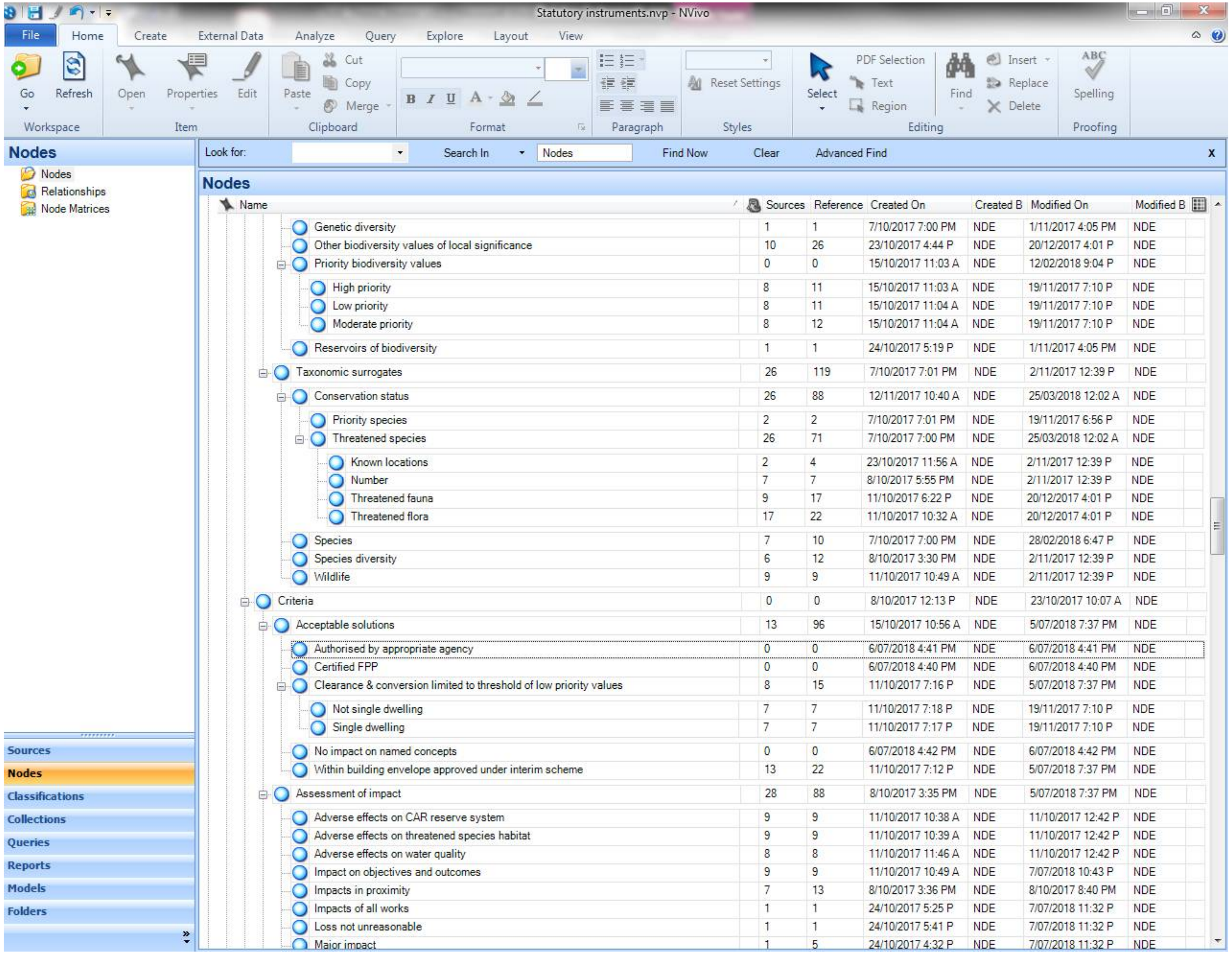
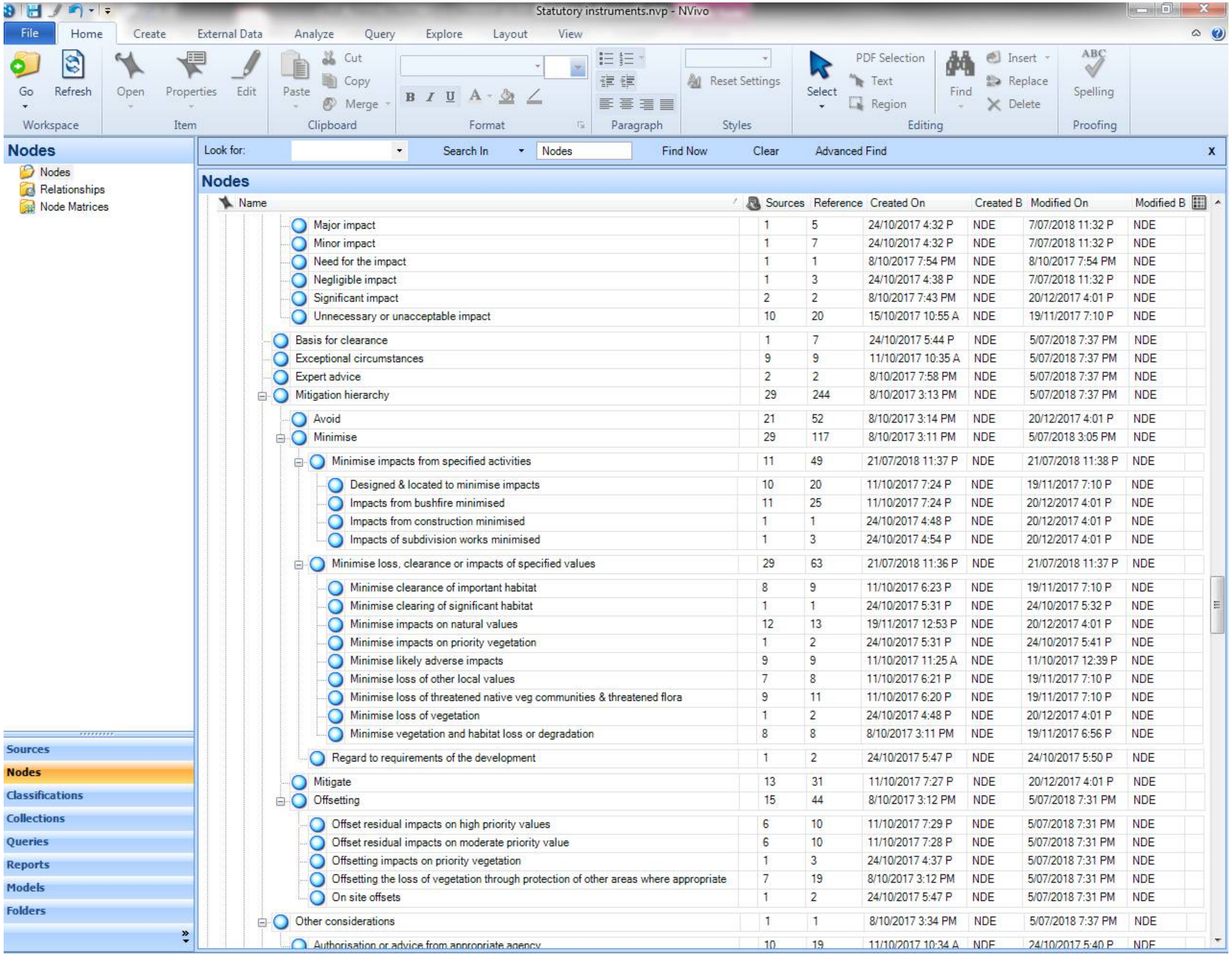
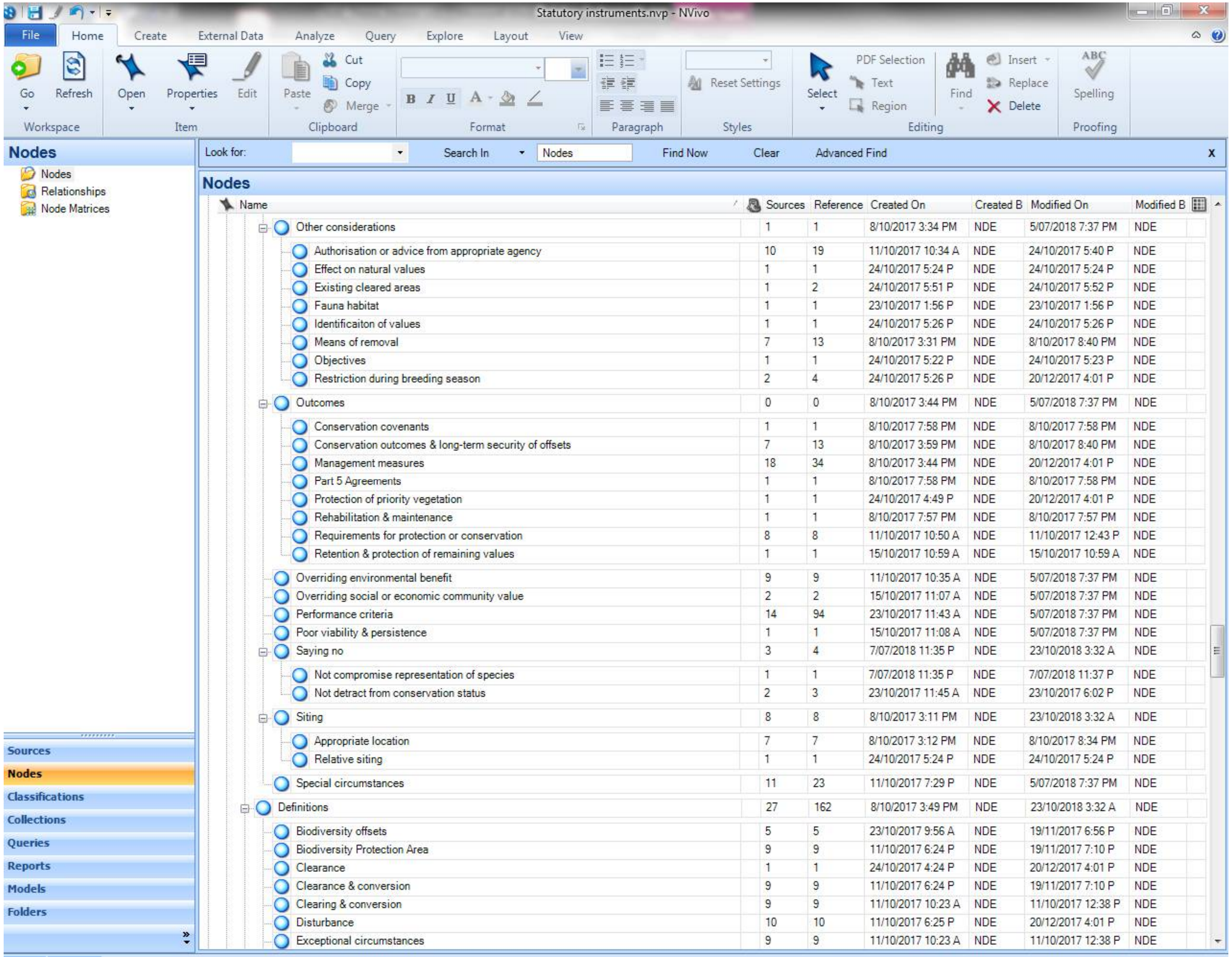
Critical habitats	6	6	8/03/2018 5:03 PM	NDE	8/03/2018 5:11 PM	NDE
Habitat for hollow dwelling species	1	1	7/10/2017 7:11 PM	NDE	19/11/2017 6:56 P	NDE
Habitat of significance	1	1	8/10/2017 7:52 PM	NDE	2/11/2017 12:38 P	NDE
Habitat value	9	9	11/10/2017 10:32 A	NDE	2/11/2017 12:38 P	NDE
High conservation value trees	1	1	7/10/2017 7:12 PM	NDE	2/11/2017 12:38 P	NDE
Important habitats	1	1	8/10/2017 7:38 PM	NDE	2/11/2017 12:38 P	NDE
Migratory species - actual or potential habitat	2	3	23/10/2017 1:53 P	NDE	13/12/2017 8:42 P	NDE
Other fauna habitat	1	1	7/10/2017 7:11 PM	NDE	2/11/2017 12:38 P	NDE
Priority habitat	7	21	7/10/2017 7:12 PM	NDE	2/11/2017 12:38 P	NDE
Threatened species habitat	21	67	7/10/2017 7:02 PM	NDE	24/03/2018 11:58 P	NDE
Critical habitat for threatened species	1	1	7/10/2017 7:02 PM	NDE	11/03/2018 10:46 P	NDE
Highly significant actual or potential habitat for threatened species	1	2	7/10/2017 7:02 PM	NDE	2/11/2017 12:38 P	NDE
Important habitat for threatened species	10	10	7/10/2017 7:10 PM	NDE	13/12/2017 12:38 P	NDE
Known or potential habitat for threatened species	1	1	23/10/2017 5:01 P	NDE	19/11/2017 6:56 P	NDE
Moderately significant actual or potential habitat for threatened species	1	2	7/10/2017 7:03 PM	NDE	2/11/2017 12:38 P	NDE
Other habitat for threatened species	4	4	7/10/2017 7:11 PM	NDE	19/11/2017 7:10 P	NDE
Potential habitat for threatened species	1	1	7/10/2017 7:10 PM	NDE	2/11/2017 12:38 P	NDE
Priority vegetation	1	2	12/11/2017 10:38 A	NDE	20/12/2017 4:01 P	NDE
Significant habitat for threatened species	1	2	7/10/2017 7:03 PM	NDE	2/11/2017 12:38 P	NDE
Threatened fauna habitat	10	11	11/10/2017 10:32 A	NDE	20/12/2017 4:01 P	NDE
Landscape function	29	157	7/10/2017 7:00 PM	NDE	14/03/2018 2:33 P	NDE
Clearing bias	1	1	7/10/2017 7:05 PM	NDE	2/11/2017 1:04 PM	NDE
Condition	7	7	7/10/2017 7:06 PM	NDE	2/11/2017 12:34 P	NDE
Connectivity	7	12	7/10/2017 7:06 PM	NDE	2/11/2017 1:04 PM	NDE
Ecological function	12	12	7/10/2017 7:07 PM	NDE	15/01/2018 4:48 P	NDE
Ecological processes	10	10	19/11/2017 8:29 P	NDE	15/01/2018 4:47 P	NDE
Extent	7	20	7/10/2017 7:06 PM	NDE	2/11/2017 12:34 P	NDE
Less than 30% native vegetation within 1km	1	1	7/10/2017 7:05 PM	NDE	19/11/2017 6:56 P	NDE
Natural processes	13	13	24/10/2017 5:19 P	NDE	20/12/2017 4:01 P	NDE
Quality	7	14	7/10/2017 7:06 PM	NDE	2/11/2017 12:34 P	NDE
Remnant vegetation	1	1	7/10/2017 7:05 PM	NDE	19/11/2017 6:56 P	NDE
Riparian & coastal vegetation	28	54	7/10/2017 7:06 PM	NDE	20/12/2017 4:01 P	NDE
Wildlife corridor	7	12	7/10/2017 7:07 PM	NDE	2/11/2017 1:04 PM	NDE
Other concepts	11	29	17/01/2018 11:53 A	NDE	14/03/2018 2:34 P	NDE
Ecologically significant areas	1	1	24/10/2017 5:20 P	NDE	25/10/2017 1:15 P	NDE
Genetic diversity	1	1	7/10/2017 7:00 PM	NDE	1/11/2017 4:05 PM	NDE



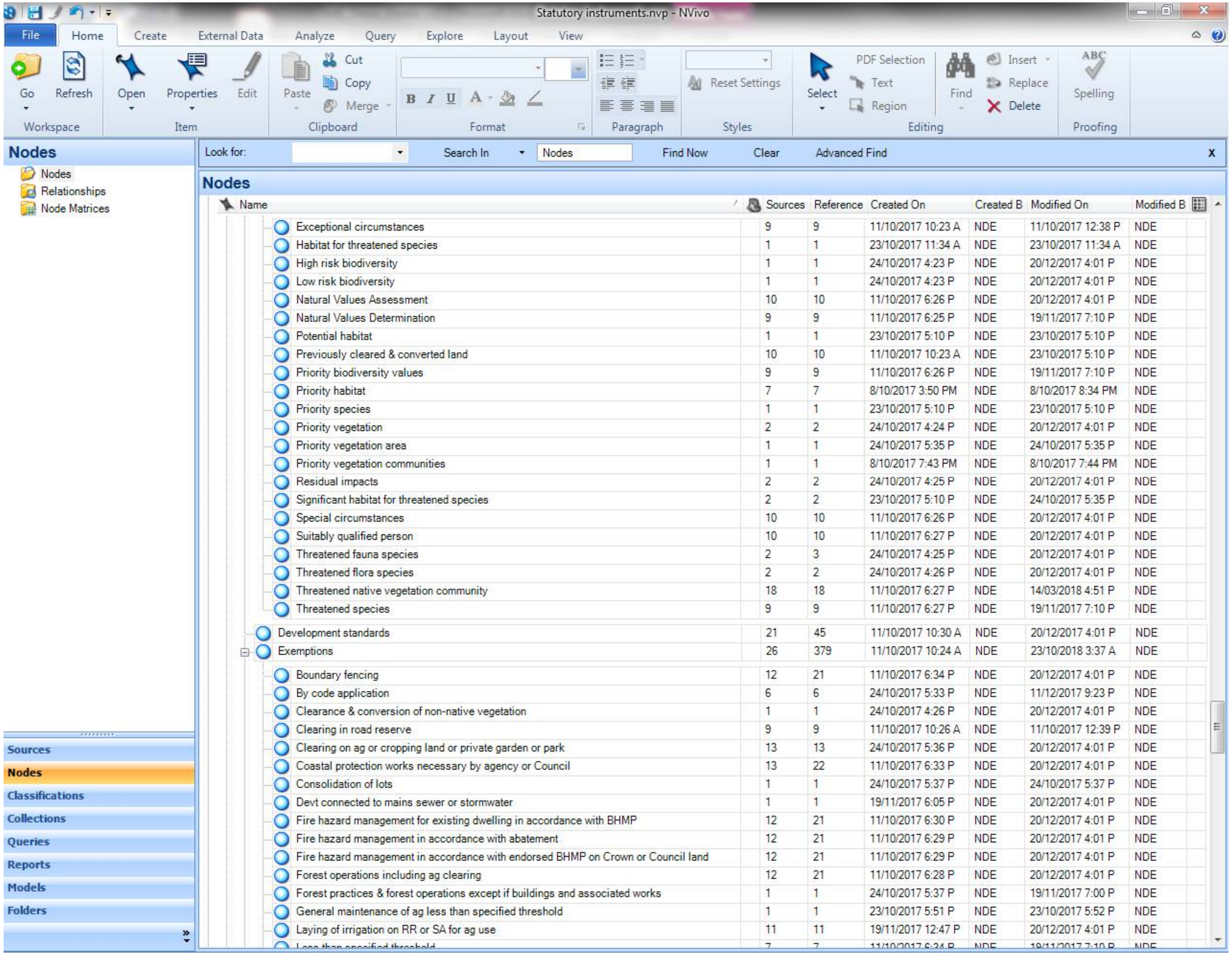
Name	Sources	Reference	Created On	Created B	Modified On	Modified B
Genetic diversity	1	1	7/10/2017 7:00 PM	NDE	1/11/2017 4:05 PM	NDE
Other biodiversity values of local significance	10	26	23/10/2017 4:44 P	NDE	20/12/2017 4:01 P	NDE
Priority biodiversity values	0	0	15/10/2017 11:03 A	NDE	12/02/2018 9:04 P	NDE
High priority	8	11	15/10/2017 11:03 A	NDE	19/11/2017 7:10 P	NDE
Low priority	8	11	15/10/2017 11:04 A	NDE	19/11/2017 7:10 P	NDE
Moderate priority	8	12	15/10/2017 11:04 A	NDE	19/11/2017 7:10 P	NDE
Reservoirs of biodiversity	1	1	24/10/2017 5:19 P	NDE	1/11/2017 4:05 PM	NDE
Taxonomic surrogates	26	119	7/10/2017 7:01 PM	NDE	2/11/2017 12:39 P	NDE
Conservation status	26	88	12/11/2017 10:40 A	NDE	25/03/2018 12:02 A	NDE
Priority species	2	2	7/10/2017 7:01 PM	NDE	19/11/2017 6:56 P	NDE
Threatened species	26	71	7/10/2017 7:00 PM	NDE	25/03/2018 12:02 A	NDE
Known locations	2	4	23/10/2017 11:56 A	NDE	2/11/2017 12:39 P	NDE
Number	7	7	8/10/2017 5:55 PM	NDE	2/11/2017 12:39 P	NDE
Threatened fauna	9	17	11/10/2017 6:22 P	NDE	20/12/2017 4:01 P	NDE
Threatened flora	17	22	11/10/2017 10:32 A	NDE	20/12/2017 4:01 P	NDE
Species	7	10	7/10/2017 7:00 PM	NDE	28/02/2018 6:47 P	NDE
Species diversity	6	12	8/10/2017 3:30 PM	NDE	2/11/2017 12:39 P	NDE
Wildlife	9	9	11/10/2017 10:49 A	NDE	2/11/2017 12:39 P	NDE
Criteria	0	0	8/10/2017 12:13 P	NDE	23/10/2017 10:07 A	NDE
Acceptable solutions	13	96	15/10/2017 10:56 A	NDE	5/07/2018 7:37 PM	NDE
Authorised by appropriate agency	0	0	6/07/2018 4:41 PM	NDE	6/07/2018 4:41 PM	NDE
Certified FPP	0	0	6/07/2018 4:40 PM	NDE	6/07/2018 4:40 PM	NDE
Clearance & conversion limited to threshold of low priority values	8	15	11/10/2017 7:16 P	NDE	5/07/2018 7:37 PM	NDE
Not single dwelling	7	7	11/10/2017 7:18 P	NDE	19/11/2017 7:10 P	NDE
Single dwelling	7	7	11/10/2017 7:17 P	NDE	19/11/2017 7:10 P	NDE
No impact on named concepts	0	0	6/07/2018 4:42 PM	NDE	6/07/2018 4:42 PM	NDE
Within building envelope approved under interim scheme	13	22	11/10/2017 7:12 P	NDE	5/07/2018 7:37 PM	NDE
Assessment of impact	28	88	8/10/2017 3:35 PM	NDE	5/07/2018 7:37 PM	NDE
Adverse effects on CAR reserve system	9	9	11/10/2017 10:38 A	NDE	11/10/2017 12:42 P	NDE
Adverse effects on threatened species habitat	9	9	11/10/2017 10:39 A	NDE	11/10/2017 12:42 P	NDE
Adverse effects on water quality	8	8	11/10/2017 11:46 A	NDE	11/10/2017 12:42 P	NDE
Impact on objectives and outcomes	9	9	11/10/2017 10:49 A	NDE	7/07/2018 10:43 P	NDE
Impacts in proximity	7	13	8/10/2017 3:36 PM	NDE	8/10/2017 8:40 PM	NDE
Impacts of all works	1	1	24/10/2017 5:25 P	NDE	7/07/2018 11:32 P	NDE
Loss not unreasonable	1	1	24/10/2017 5:41 P	NDE	7/07/2018 11:32 P	NDE
Major impact	1	5	24/10/2017 4:32 P	NDE	7/07/2018 11:32 P	NDE



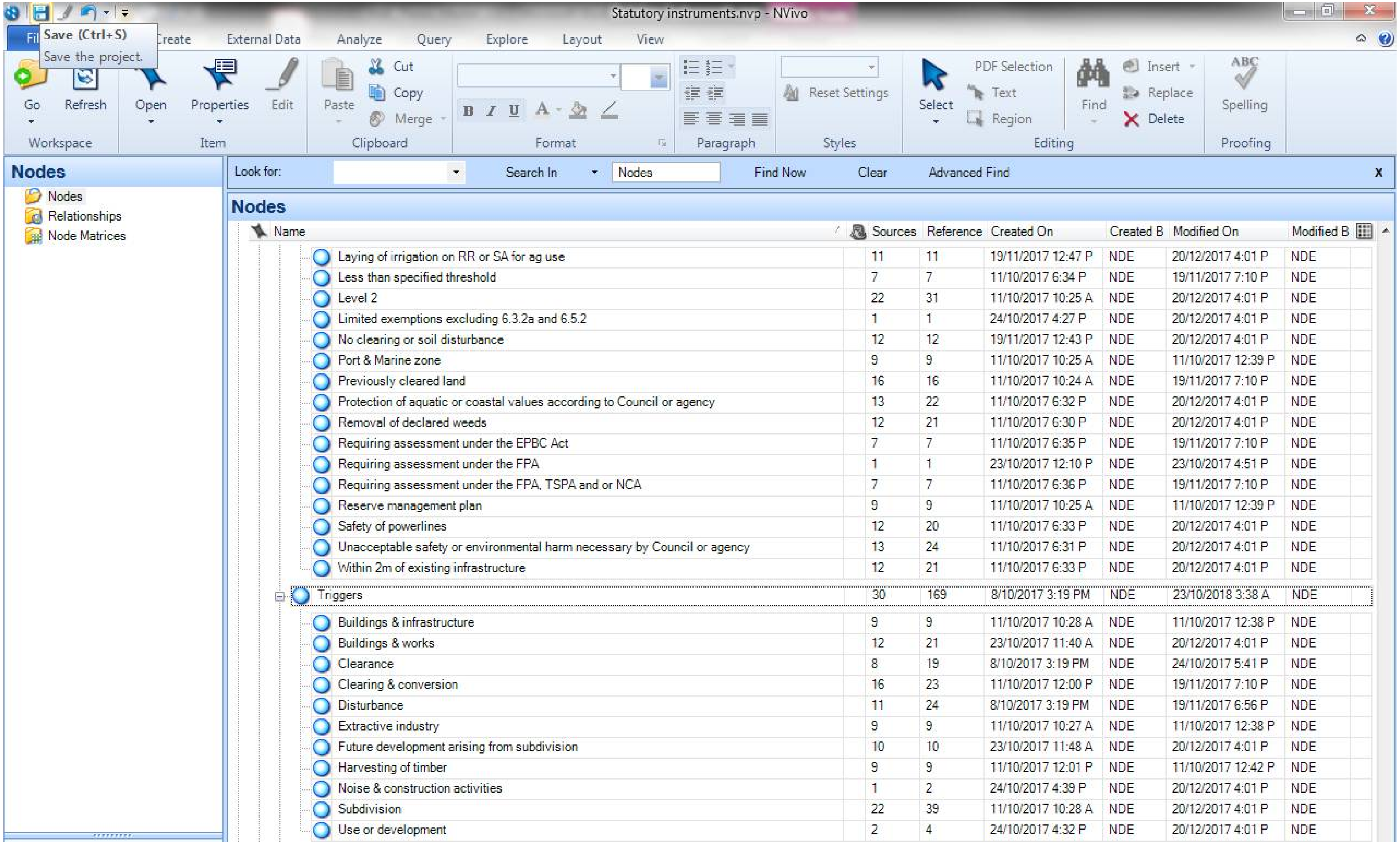
Name	Sources	Reference	Created On	Created B	Modified On	Modified B
Major impact	1	5	24/10/2017 4:32 P	NDE	7/07/2018 11:32 P	NDE
Minor impact	1	7	24/10/2017 4:32 P	NDE	7/07/2018 11:32 P	NDE
Need for the impact	1	1	8/10/2017 7:54 PM	NDE	8/10/2017 7:54 PM	NDE
Negligible impact	1	3	24/10/2017 4:38 P	NDE	7/07/2018 11:32 P	NDE
Significant impact	2	2	8/10/2017 7:43 PM	NDE	20/12/2017 4:01 P	NDE
Unnecessary or unacceptable impact	10	20	15/10/2017 10:55 A	NDE	19/11/2017 7:10 P	NDE
Basis for clearance	1	7	24/10/2017 5:44 P	NDE	5/07/2018 7:37 PM	NDE
Exceptional circumstances	9	9	11/10/2017 10:35 A	NDE	5/07/2018 7:37 PM	NDE
Expert advice	2	2	8/10/2017 7:58 PM	NDE	5/07/2018 7:37 PM	NDE
Mitigation hierarchy	29	244	8/10/2017 3:13 PM	NDE	5/07/2018 7:37 PM	NDE
Avoid	21	52	8/10/2017 3:14 PM	NDE	20/12/2017 4:01 P	NDE
Minimise	29	117	8/10/2017 3:11 PM	NDE	5/07/2018 3:05 PM	NDE
Minimise impacts from specified activities	11	49	21/07/2018 11:37 P	NDE	21/07/2018 11:38 P	NDE
Designed & located to minimise impacts	10	20	11/10/2017 7:24 P	NDE	19/11/2017 7:10 P	NDE
Impacts from bushfire minimised	11	25	11/10/2017 7:24 P	NDE	20/12/2017 4:01 P	NDE
Impacts from construction minimised	1	1	24/10/2017 4:48 P	NDE	20/12/2017 4:01 P	NDE
Impacts of subdivision works minimised	1	3	24/10/2017 4:54 P	NDE	20/12/2017 4:01 P	NDE
Minimise loss, clearance or impacts of specified values	29	63	21/07/2018 11:36 P	NDE	21/07/2018 11:37 P	NDE
Minimise clearance of important habitat	8	9	11/10/2017 6:23 P	NDE	19/11/2017 7:10 P	NDE
Minimise clearing of significant habitat	1	1	24/10/2017 5:31 P	NDE	24/10/2017 5:32 P	NDE
Minimise impacts on natural values	12	13	19/11/2017 12:53 P	NDE	20/12/2017 4:01 P	NDE
Minimise impacts on priority vegetation	1	2	24/10/2017 5:31 P	NDE	24/10/2017 5:41 P	NDE
Minimise likely adverse impacts	9	9	11/10/2017 11:25 A	NDE	11/10/2017 12:39 P	NDE
Minimise loss of other local values	7	8	11/10/2017 6:21 P	NDE	19/11/2017 7:10 P	NDE
Minimise loss of threatened native veg communities & threatened flora	9	11	11/10/2017 6:20 P	NDE	19/11/2017 7:10 P	NDE
Minimise loss of vegetation	1	2	24/10/2017 4:48 P	NDE	20/12/2017 4:01 P	NDE
Minimise vegetation and habitat loss or degradation	8	8	8/10/2017 3:11 PM	NDE	19/11/2017 6:56 P	NDE
Regard to requirements of the development	1	2	24/10/2017 5:47 P	NDE	24/10/2017 5:50 P	NDE
Mitigate	13	31	11/10/2017 7:27 P	NDE	20/12/2017 4:01 P	NDE
Offsetting	15	44	8/10/2017 3:12 PM	NDE	5/07/2018 7:31 PM	NDE
Offset residual impacts on high priority values	6	10	11/10/2017 7:29 P	NDE	5/07/2018 7:31 PM	NDE
Offset residual impacts on moderate priority value	6	10	11/10/2017 7:28 P	NDE	5/07/2018 7:31 PM	NDE
Offsetting impacts on priority vegetation	1	3	24/10/2017 4:37 P	NDE	5/07/2018 7:31 PM	NDE
Offsetting the loss of vegetation through protection of other areas where appropriate	7	19	8/10/2017 3:12 PM	NDE	5/07/2018 7:31 PM	NDE
On site offsets	1	2	24/10/2017 5:47 P	NDE	5/07/2018 7:31 PM	NDE
Other considerations	1	1	8/10/2017 3:34 PM	NDE	5/07/2018 7:37 PM	NDE
Authorisation or advice from appropriate agency	10	19	11/10/2017 10:34 A	NDE	24/10/2017 5:40 P	NDE



Name	Sources	Reference	Created On	Created B	Modified On	Modified B
Other considerations	1	1	8/10/2017 3:34 PM	NDE	5/07/2018 7:37 PM	NDE
Authorisation or advice from appropriate agency	10	19	11/10/2017 10:34 A	NDE	24/10/2017 5:40 P	NDE
Effect on natural values	1	1	24/10/2017 5:24 P	NDE	24/10/2017 5:24 P	NDE
Existing cleared areas	1	2	24/10/2017 5:51 P	NDE	24/10/2017 5:52 P	NDE
Fauna habitat	1	1	23/10/2017 1:56 P	NDE	23/10/2017 1:56 P	NDE
Identificaiton of values	1	1	24/10/2017 5:26 P	NDE	24/10/2017 5:26 P	NDE
Means of removal	7	13	8/10/2017 3:31 PM	NDE	8/10/2017 8:40 PM	NDE
Objectives	1	1	24/10/2017 5:22 P	NDE	24/10/2017 5:23 P	NDE
Restriction during breeding season	2	4	24/10/2017 5:26 P	NDE	20/12/2017 4:01 P	NDE
Outcomes	0	0	8/10/2017 3:44 PM	NDE	5/07/2018 7:37 PM	NDE
Conservation covenants	1	1	8/10/2017 7:58 PM	NDE	8/10/2017 7:58 PM	NDE
Conservation outcomes & long-term security of offsets	7	13	8/10/2017 3:59 PM	NDE	8/10/2017 8:40 PM	NDE
Management measures	18	34	8/10/2017 3:44 PM	NDE	20/12/2017 4:01 P	NDE
Part 5 Agreements	1	1	8/10/2017 7:58 PM	NDE	8/10/2017 7:58 PM	NDE
Protection of priority vegetation	1	1	24/10/2017 4:49 P	NDE	20/12/2017 4:01 P	NDE
Rehabilitation & maintenance	1	1	8/10/2017 7:57 PM	NDE	8/10/2017 7:57 PM	NDE
Requirements for protection or conservation	8	8	11/10/2017 10:50 A	NDE	11/10/2017 12:43 P	NDE
Retention & protection of remaining values	1	1	15/10/2017 10:59 A	NDE	15/10/2017 10:59 A	NDE
Overriding environmental benefit	9	9	11/10/2017 10:35 A	NDE	5/07/2018 7:37 PM	NDE
Overriding social or economic community value	2	2	15/10/2017 11:07 A	NDE	5/07/2018 7:37 PM	NDE
Performance criteria	14	94	23/10/2017 11:43 A	NDE	5/07/2018 7:37 PM	NDE
Poor viability & persistence	1	1	15/10/2017 11:08 A	NDE	5/07/2018 7:37 PM	NDE
Saying no	3	4	7/07/2018 11:35 P	NDE	23/10/2018 3:32 A	NDE
Not compromise representation of species	1	1	7/07/2018 11:35 P	NDE	7/07/2018 11:37 P	NDE
Not detract from conservation status	2	3	23/10/2017 11:45 A	NDE	23/10/2017 6:02 P	NDE
Siting	8	8	8/10/2017 3:11 PM	NDE	23/10/2018 3:32 A	NDE
Appropriate location	7	7	8/10/2017 3:12 PM	NDE	8/10/2017 8:34 PM	NDE
Relative siting	1	1	24/10/2017 5:24 P	NDE	24/10/2017 5:24 P	NDE
Special circumstances	11	23	11/10/2017 7:29 P	NDE	5/07/2018 7:37 PM	NDE
Definitions	27	162	8/10/2017 3:49 PM	NDE	23/10/2018 3:32 A	NDE
Biodiversity offsets	5	5	23/10/2017 9:56 A	NDE	19/11/2017 6:56 P	NDE
Biodiversity Protection Area	9	9	11/10/2017 6:24 P	NDE	19/11/2017 7:10 P	NDE
Clearance	1	1	24/10/2017 4:24 P	NDE	20/12/2017 4:01 P	NDE
Clearance & conversion	9	9	11/10/2017 6:24 P	NDE	19/11/2017 7:10 P	NDE
Clearing & conversion	9	9	11/10/2017 10:23 A	NDE	11/10/2017 12:38 P	NDE
Disturbance	10	10	11/10/2017 6:25 P	NDE	20/12/2017 4:01 P	NDE
Exceptional circumstances	9	9	11/10/2017 10:23 A	NDE	11/10/2017 12:38 P	NDE



Name	Sources	Reference	Created On	Created B	Modified On	Modified B
Exceptional circumstances	9	9	11/10/2017 10:23 A	NDE	11/10/2017 12:38 P	NDE
Habitat for threatened species	1	1	23/10/2017 11:34 A	NDE	23/10/2017 11:34 A	NDE
High risk biodiversity	1	1	24/10/2017 4:23 P	NDE	20/12/2017 4:01 P	NDE
Low risk biodiversity	1	1	24/10/2017 4:23 P	NDE	20/12/2017 4:01 P	NDE
Natural Values Assessment	10	10	11/10/2017 6:26 P	NDE	20/12/2017 4:01 P	NDE
Natural Values Determination	9	9	11/10/2017 6:25 P	NDE	19/11/2017 7:10 P	NDE
Potential habitat	1	1	23/10/2017 5:10 P	NDE	23/10/2017 5:10 P	NDE
Previously cleared & converted land	10	10	11/10/2017 10:23 A	NDE	23/10/2017 5:10 P	NDE
Priority biodiversity values	9	9	11/10/2017 6:26 P	NDE	19/11/2017 7:10 P	NDE
Priority habitat	7	7	8/10/2017 3:50 PM	NDE	8/10/2017 8:34 PM	NDE
Priority species	1	1	23/10/2017 5:10 P	NDE	23/10/2017 5:10 P	NDE
Priority vegetation	2	2	24/10/2017 4:24 P	NDE	20/12/2017 4:01 P	NDE
Priority vegetation area	1	1	24/10/2017 5:35 P	NDE	24/10/2017 5:35 P	NDE
Priority vegetation communities	1	1	8/10/2017 7:43 PM	NDE	8/10/2017 7:44 PM	NDE
Residual impacts	2	2	24/10/2017 4:25 P	NDE	20/12/2017 4:01 P	NDE
Significant habitat for threatened species	2	2	23/10/2017 5:10 P	NDE	24/10/2017 5:35 P	NDE
Special circumstances	10	10	11/10/2017 6:26 P	NDE	20/12/2017 4:01 P	NDE
Suitably qualified person	10	10	11/10/2017 6:27 P	NDE	20/12/2017 4:01 P	NDE
Threatened fauna species	2	3	24/10/2017 4:25 P	NDE	20/12/2017 4:01 P	NDE
Threatened flora species	2	2	24/10/2017 4:26 P	NDE	20/12/2017 4:01 P	NDE
Threatened native vegetation community	18	18	11/10/2017 6:27 P	NDE	14/03/2018 4:51 P	NDE
Threatened species	9	9	11/10/2017 6:27 P	NDE	19/11/2017 7:10 P	NDE
Development standards	21	45	11/10/2017 10:30 A	NDE	20/12/2017 4:01 P	NDE
Exemptions	26	379	11/10/2017 10:24 A	NDE	23/10/2018 3:37 A	NDE
Boundary fencing	12	21	11/10/2017 6:34 P	NDE	20/12/2017 4:01 P	NDE
By code application	6	6	24/10/2017 5:33 P	NDE	11/12/2017 9:23 P	NDE
Clearance & conversion of non-native vegetation	1	1	24/10/2017 4:26 P	NDE	20/12/2017 4:01 P	NDE
Clearing in road reserve	9	9	11/10/2017 10:26 A	NDE	11/10/2017 12:39 P	NDE
Clearing on ag or cropping land or private garden or park	13	13	24/10/2017 5:36 P	NDE	20/12/2017 4:01 P	NDE
Coastal protection works necessary by agency or Council	13	22	11/10/2017 6:33 P	NDE	20/12/2017 4:01 P	NDE
Consolidation of lots	1	1	24/10/2017 5:37 P	NDE	24/10/2017 5:37 P	NDE
Devt connected to mains sewer or stormwater	1	1	19/11/2017 6:05 P	NDE	20/12/2017 4:01 P	NDE
Fire hazard management for existing dwelling in accordance with BHMP	12	21	11/10/2017 6:30 P	NDE	20/12/2017 4:01 P	NDE
Fire hazard management in accordance with abatement	12	21	11/10/2017 6:29 P	NDE	20/12/2017 4:01 P	NDE
Fire hazard management in accordance with endorsed BHMP on Crown or Council land	12	21	11/10/2017 6:29 P	NDE	20/12/2017 4:01 P	NDE
Forest operations including ag clearing	12	21	11/10/2017 6:28 P	NDE	20/12/2017 4:01 P	NDE
Forest practices & forest operations except if buildings and associated works	1	1	24/10/2017 5:37 P	NDE	19/11/2017 7:00 P	NDE
General maintenance of ag less than specified threshold	1	1	23/10/2017 5:51 P	NDE	23/10/2017 5:52 P	NDE
Laying of irrigation on RR or SA for ag use	11	11	19/11/2017 12:47 P	NDE	20/12/2017 4:01 P	NDE
Less than specified threshold	7	7	11/10/2017 6:24 P	NDE	19/11/2017 7:10 P	NDE



Name	Sources	Reference	Created On	Created B	Modified On	Modified B
Laying of irrigation on RR or SA for ag use	11	11	19/11/2017 12:47 P	NDE	20/12/2017 4:01 P	NDE
Less than specified threshold	7	7	11/10/2017 6:34 P	NDE	19/11/2017 7:10 P	NDE
Level 2	22	31	11/10/2017 10:25 A	NDE	20/12/2017 4:01 P	NDE
Limited exemptions excluding 6.3.2a and 6.5.2	1	1	24/10/2017 4:27 P	NDE	20/12/2017 4:01 P	NDE
No clearing or soil disturbance	12	12	19/11/2017 12:43 P	NDE	20/12/2017 4:01 P	NDE
Port & Marine zone	9	9	11/10/2017 10:25 A	NDE	11/10/2017 12:39 P	NDE
Previously cleared land	16	16	11/10/2017 10:24 A	NDE	19/11/2017 7:10 P	NDE
Protection of aquatic or coastal values according to Council or agency	13	22	11/10/2017 6:32 P	NDE	20/12/2017 4:01 P	NDE
Removal of declared weeds	12	21	11/10/2017 6:30 P	NDE	20/12/2017 4:01 P	NDE
Requiring assessment under the EPBC Act	7	7	11/10/2017 6:35 P	NDE	19/11/2017 7:10 P	NDE
Requiring assessment under the FPA	1	1	23/10/2017 12:10 P	NDE	23/10/2017 4:51 P	NDE
Requiring assessment under the FPA, TSPA and or NCA	7	7	11/10/2017 6:36 P	NDE	19/11/2017 7:10 P	NDE
Reserve management plan	9	9	11/10/2017 10:25 A	NDE	11/10/2017 12:39 P	NDE
Safety of powerlines	12	20	11/10/2017 6:33 P	NDE	20/12/2017 4:01 P	NDE
Unacceptable safety or environmental harm necessary by Council or agency	13	24	11/10/2017 6:31 P	NDE	20/12/2017 4:01 P	NDE
Within 2m of existing infrastructure	12	21	11/10/2017 6:33 P	NDE	20/12/2017 4:01 P	NDE
Triggers	30	169	8/10/2017 3:19 PM	NDE	23/10/2018 3:38 A	NDE
Buildings & infrastructure	9	9	11/10/2017 10:28 A	NDE	11/10/2017 12:38 P	NDE
Buildings & works	12	21	23/10/2017 11:40 A	NDE	20/12/2017 4:01 P	NDE
Clearance	8	19	8/10/2017 3:19 PM	NDE	24/10/2017 5:41 P	NDE
Clearing & conversion	16	23	11/10/2017 12:00 P	NDE	19/11/2017 7:10 P	NDE
Disturbance	11	24	8/10/2017 3:19 PM	NDE	19/11/2017 6:56 P	NDE
Extractive industry	9	9	11/10/2017 10:27 A	NDE	11/10/2017 12:38 P	NDE
Future development arising from subdivision	10	10	23/10/2017 11:48 A	NDE	20/12/2017 4:01 P	NDE
Harvesting of timber	9	9	11/10/2017 12:01 P	NDE	11/10/2017 12:42 P	NDE
Noise & construction activities	1	2	24/10/2017 4:39 P	NDE	20/12/2017 4:01 P	NDE
Subdivision	22	39	11/10/2017 10:28 A	NDE	20/12/2017 4:01 P	NDE
Use or development	2	4	24/10/2017 4:32 P	NDE	20/12/2017 4:01 P	NDE

Appendix VII – Monitoring plan for the audit of protected areas

Objectives

The objective of the monitoring is to evaluate the effectiveness of Part 5 Agreements as a tool for protecting identified biodiversity values.

Monitoring Questions

The specific monitoring questions to be answered are:

(i) What is the current extent and quality of identified biodiversity values within the Part 5 Agreement area?

(ii) How have these changed over time?

(iii) What management actions were required?

(iv) Have these management actions been implemented?

(v) Are these management actions successful?

(vi) What future management actions are required?

Prioritisation of Agreements for Monitoring

To determine which agreements and sites would be monitored, they were prioritised on the basis of:

(i) maximum variation in the agreements and sites monitored to obtain information about the importance of various circumstances for case process and outcome;

(ii) sites with biodiversity values dependent upon the Kingborough area for their long-term persistence, including values largely confined in their total distribution to the municipal area or with most of their range within the municipal area;

(iii) the length of time agreements had been in place, with priority given to agreements which had been in place for > 5 years as these are overdue for monitoring, and sites with Agreements established after 2010 excluded as they are considered to be too recent to warrant monitoring;

(iv) resource and time constraints.

Determination of Assessment Zones

Determination of assessment zones is predominantly based on the Vegetation Condition Assessment (VCA) method (Michaels 2006), with:

(i) a zone being the spatial units within a site in which the ecological attributes are measured ;

(ii) the size of the assessment zone being 1ha (a 56m radius circle plot from a central point) or a number of 20x20m quadrats, except where distribution of trees is not uniform, where a 40x40m sample plot is used (State of Victoria 2014);

(iii) each zone is located within a discrete area of native vegetation consisting of a single TASVEG vegetation community with an observed similar averaged condition across its extent;

(iv) the number of zones being relative to the size of the site, with a small significant change in condition warranting a separate assessment on a small site, whereas on a large site, it may be incorporated into an average score;

(v) a different assessment required where there is a one category difference in four or more of the assessed site components or two categories difference in any one of the assessed site components; and,

(vi) zones not necessarily needing to be contiguous (Michaels 2006).

For tree sampling, the number of plots within the assessment zone is determined by the size of the zone and the variation across it, with a minimum of 3 plots in any uniform section and 15-30 trees in each plot, unless one or two plots cover most of the site, in which case all trees are measured (Reid & Stephen 2001). For large uniform forests, the total area of all plots should be 2% of the total forest area (Reid & Stephen 2001).

Attributes & Methods

The monitoring plan includes attributes specific to each agreement and the values to be protected, the management prescriptions to be implemented and the ongoing monitoring required. The monitoring plan also measures standard ecological attributes using existing standard methods derived from relevant assessment and monitoring methodologies including the VCA method (Michaels 2006), the Biophysical Naturalness (BN) method (Knight & Cullen 2010a), the Forest Conservation Fund (FCF) Conservation Value Index (CVI) (Eigenraam et al. 2006), the Department of Primary Industries, Parks, Water and Environment (DPIPWE) Technical Manual (Barker 2001), DPIPWE's Land Manager's Guide (Barnes & McCoull 2002), Mature Habitat method (Forest Practices Authority 2012), Forty-spotted pardalote habitat plots (Bryant 2010) and the Habitat Hectares method (State of Victoria 2014).

Table 1 below provides a summary of the attributes measured, the specific methods used, the source of the data relied upon, the origin of these methods and the justification for the attribute and method.

Table 1: Summary of Attributes & Methods

Attribute	Method	Data source	Origin	Justification
Native vegetation				
Zone waypoint	Take waypoint of centre of assessment zone & record the waypoint #	GPS	VCA method (Michaels 2006)	Accepted standard measure
Current Extent	Extent in ha	Field based mapping (GPS) & aerial photo interpretation depending upon scale of conservation zone	VCA method (Michaels 2006) BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	Accepted standard measure
Change in extent	Change in area	Aerial imagery from 2005 imagery to 2011, field verification & consultants reports		Shows changes in extent over time, which indicates whether or not formal protection results in maintenance of extent.
TASVEG Community	Determine the relevant vegetation community on site using TASVEG community descriptions and keys and/or the TASVEG community benchmarks in combination with direct field observations.	Field based verification, consultants reports, Council's Biodiversity Mapping and Priority Plant Community Mapping, and TASVEG in order of preference. Source depends upon scale of conservation zone, practicalities of ground-truthing and availability of consultant's reports.	VCA method (Michaels 2006) BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	Accepted standard measure
Vegetation structure & health				
Large Trees	Record the location, species & diameter of trees >= the benchmark for large trees for that vegetation community, to determine the # of large trees/ha	Field based assessment (DBH tape & GPS) & aerial imagery	VCA method (Michaels 2006)	Surrogate for maturity & hollow-dwelling habitat. Record the actual location, size & species of trees >= the benchmark. This can then be translated into the VCA benchmark for large trees & used to estimate the appropriate maturity class.
Structural Maturity	Record the forest structure maturity of the zone	Field based assessment & aerial imagery	BN method (Knight & Cullen 2010a)	Measure of maturity. Classes are Mature (Mature), Predominantly Mature-Some Regrowth (PM SRg), Predominantly

Attribute	Method	Data source	Origin	Justification
				Regrowth-Some Mature (PRg SM), Regrowth and Silvicultural Regeneration (Regen.). Nests with standard classes used in forestry PI-type mapping .and published maps from the RFA.
	Take a photo of the canopy of each large tree within the assessment zone & use in conjunction with aerial imagery to determine the % canopy health of large trees	Field based assessment, photo-monitoring & aerial imagery	VCA method (Michaels 2006)	Standard measure of health of large trees
	Take a photo of the canopy of each large tree within the assessment zone & use in conjunction with aerial imagery to determine the % canopy trees showing senescent characteristics	Field based assessment, photo-monitoring & aerial imagery	BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	Measure of senescence. Classes are 0%, 1-10%, 10-30% and >30%.
Canopy health (%)	Proportion of healthy canopy based on the average of the canopy trees within the assessment zone. Take a photo of the canopy of each canopy tree within the assessment zone. Use the photos in conjunction with aerial imagery to estimate the % canopy health of each tree as per the diagrams in Appendix 2 as a guide, then calculate the average across the zone.	Field based assessment, photo-monitoring & aerial imagery	VCA method (Michaels 2006) BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	BN classes are >75%, 50-75%, <50%, na VCA classes are >70%, 30-70%, <30% Estimate the actual canopy health in 5% increments – this can then be translated into either the BN classes or the VCA classes. Surrogate for senescence, with poor canopy health = senescence
Projective foliage cover	Assess the projective foliage cover based on the average of the canopy trees within the assessment zone. Take a photo of the canopy of each canopy tree within the assessment zone. Use the photos in conjunction with aerial imagery to estimate the % projective foliage cover as per Appendix 1. These cover diagrams also provide an indication of the height and spacing between trees. Having estimated the cover of the individual trees, the assessor should then consider the distance between individual canopy trees and the size of 'gaps' that may occur in the canopy cover (Michaels 2006).	Field based assessment, photo-monitoring & aerial imagery	VCA method (Michaels 2006)	VCA uses a benchmark. No measure in BN. FCF measures healthy canopy cover to determine eligibility but not used for forest health. Bryant (2011) uses projective foliage cover in her conservation assessment of forty-spotted pardalotes to determine the canopy health as a surrogate for the amount of potential foraging habitat and food resource. In the Draft Habitat Hectares v2.0, 'the projective foliage cover of life forms as a proxy for their structural contribution' (2014:2).

Attribute	Method	Data source	Origin	Justification
Logs	Observed length of all logs in 17m radius & observed length of large logs. Large logs are ½ the DBH of large trees and logs are anything with diameter >10cm.	Field based assessment	VCA method (Michaels 2006)	Surrogate for cutdowners in FCF & BN Method
Recruitment				
Recruitment (present & adequate)	Recruitment is defined as the establishment of individual plants beyond initial seedling stage and survival for at least one year since germination or first establishment. For canopy species adequate recruitment requires at least 2 cohorts to be present (ie seedlings <2m & saplings >2m). Where canopy cover < benchmark, adequate recruitment also requires sufficient recruitment to return canopy the tree canopy cover to the benchmark over time. For woody species adequate recruitment requires that the number of immature individuals of each species is at least 10% of the number of observed mature individuals of that species.	Field based assessment	VCA method (Michaels 2006)	Assesses recruitment for canopy trees, sub-canopy tree & large shrub species and small-medium shrubs. Benchmark clarifies if recruitment is episodic or continuous and acknowledges that the absence of recruitment without appropriate disturbance events or stimuli would not be considered a failure of recruitment. Proposed to use VCA, which can then be translated in BN/FCF approach. Can also compare with canopy health/cover to see if recruitment scores are lower where canopy health good, and therefore if it is a useful measure.
Vegetation composition				
Weeds				
Weed distribution	Map	Field based assessment		Shows the species, location & extent of weed infestations. Can be translated into BN weed categories of dominant, second dominant & no. of weed species.
Weed cover (0, <1%, <5%, 5-10%, 10-25%, 25-50%, 50-75%, >75%).	Assign Braun-Blanquet percentage classes of weed cover/ha. Estimate the weed cover in a 56m radius from a given point. Repeat this a number of times across the zone to get the average weed cover/ha (ie. sum the canopy health scores and divide by the number of repetitions).	Field based assessment	VCA method (Michaels 2006) BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	'Increasing weed abundance increases the potential ecological impact. The assessment of abundance is based on the % cover and distribution of weeds species using modified Braun-Blanquet cover and sociability classes' (FCF, 2009:16). Accepted standard measure however classes vary. BN & FCF use >75%, 50-75, <50%, na VCA use >75%, 25-75%, 10-25%, 5-10% & <5%.

Attribute	Method	Data source	Origin	Justification
				Measure in 25% increments where weed cover is >25%, & use VCA classes for <25% – this can then be translated into either the BN classes or the VCA classes.
Weed pattern	Braun-Blanquet distribution pattern, point, clumped, scattered, continuous.	Field based assessment	BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	
Native vegetation diversity				
Mid & understorey species diversity	Inventory of species across the zone (random meander). Photo monitoring of the ground in 2x2m quadrats around photo monitoring points. Inventory of species in 2x2m quadrats around photo monitoring points.	Field based assessment & photo monitoring	As per VCA but includes photo-monitoring of quadrats centred around photo monitoring points. Additional to BN Method.	Basic attributes can be translated into VCA lifeform codes. No equivalent surrogate in BN – it only addresses understorey cover not diversity. Note this approach would not enable translation into individual cover classes for each lifeform, but only within lifeform categories.
Native vegetation cover The assessment of Native Vegetation Cover uses surrogate for the diversity and composition of mid-storey and understorey life forms. This method adopts the BN method, which itself is a simplified version of the VCA. This method also includes an additional surrogate for diversity, based on a simplified version of the VCA. This approach enables translation into the BN method and provides surrogates for the key VCA attributes/measures.				
Mid-storey native cover (5% classes of native midstorey cover eg 0-10%, 10-20% etc)	Estimate the cover of woody lifeforms (except prostrate shrubs) not forming part of the vegetation canopy. Record estimated cover around/within	Field based assessment & photo monitoring	BN method (Knight & Cullen 2010a)	This surrogate is derived by grouping & summing the life form covers. Overstorey life forms have been addressed in the preceding sections on Vegetation Structure (Knight & Cullen, 2010:37). Note while these attributes enable an overall estimate of cover, it does not enable calculation of the % observed cover within each individual lifeform code, only differentiation into midstorey and understorey lifeforms. Note, division of midstorey & understorey lifeform codes in BN is different to VCA – which is more about differentiation into woody & non-woody cover. Proposed to adapt BN so it
Understorey native cover (5% classes of native understorey cover eg 0-	Defined as prostrate shrubs & non-woody life forms. Vegetation Condition Benchmark life form covers grouped and summed.	Field based assessment	BN method (Knight & Cullen 2010a)	

Attribute	Method	Data source	Origin	Justification
10%, 10-20% etc)				differentiates not on the basis of height but on the basis of woody vs non-woody (with the exception of prostrate shrubs, which is included in the understorey category).
Organic litter	% observed litter in 5% increments	Field based assessment	VCA method (Michaels 2006)	
Disease				
Phytophthora cinnamomi presence	Symptomatic evidence of presence of the root rot fungus *Phtyophthora cinnamomi*	Field based assessment	VCA method (Michaels 2006) BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	
Vegetation modification				
Large stumps #/ha	Large stumps are those with a diameter consistent with canopy trees	Field based assessment	BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	
Small stumps #/ha	Small stumps are those with a diameter consistent with mid-storey trees	Field based assessment	BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	
Grazing	Note if the vegetation structure is considered to have been altered by grazing, cutting or slashing. Evidence will usually be in the form of an absent component of the vegetation, for example mid-storey, or native understorey strata of even height that show evidence of mechanical cutting. Can also include mechanical cutting of larger shrubs and trees. Consult the Vegetation Condition Benchmarks for guidance.	Field based assessment	BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	'Grazing, Cutting and Fire are considered the main factors likely to alter the structural characteristics of non-forest vegetation. A range of other factors (e.g. altered hydrology) may also produce structural changes to vegetation but were not considered to operate consistently and were therefore excluded from the current version of the method' (Knight&Cullen, 2010:29). BN only uses this measure in relation to NF, but modification from grazing, cutting or slashing also useful to note for forest vegetation as it would also influence condition.
Cutting/logging		Field based assessment	BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	
Slashing		Field based assessment	BN method (Knight & Cullen 2010a) FCF CVI method (Eigenraam et al. 2006)	
Fire	Yes/No class indicating if vegetation structure considered to have been altered by fire and	Field based assessment	BN method (Knight & Cullen 2010a)	

Attribute	Method	Data source	Origin	Justification
	approximate time-frame of last fire. Fire occurs naturally at varying frequency in many vegetation types. High fire frequency may shift vegetation to another community or may be indicated by large numbers of burnt dead trees.		FCF CVI method (Eigenraam et al. 2006)	
Special Values				
Threatened flora				
Population size/density	Estimate mean density per unit area x (area of occupancy/unit area) (Barker, 2001:3)	Field based assessment using a gps and photo-monitoring	DPIPWE Technical Manual (Barker 2001)	Indicator of current population size & enables changes in population size over time to be determined
Threatened fauna habitat				
Hollow dwelling habitat	Number of trees/ha with a dbh >= benchmark	Field based assessment using DBH & the Bitterlich method & aerial imagery	Mature Habitat method (Forest Practices Authority 2012)	Use large trees measure as surrogate. High (dry forest) = at least 8 trees/ha are over 100 cm dbh or 15 trees/ha are over benchmark dbh High (wet forest) = At least 15 trees/ha are over 100 cm dbh or 8 trees /ha over 150 cm dbh Medium (dry forest) = At least 8 trees/ha are greater than 70 cm dbh Medium (wet forest) = At least 8 trees/ha are greater than 100 cm dbh Low (dry forest) = Trees over 70 cm dbh are present, but comprise less than 8 trees/ha Low (wet forest) = Trees over 100 cm dbh are present, but comprise less than 8 trees/ha
Forty-spotted pardalote habitat	*Forty-spot foraging* Number of eucs in size classes gums 10-30cm/ha, >30-70cm/ha, >70cm number of white gums 10-30cm/ha, >30-benchmark/ha, >benchmark Then work out the proportion of white gums relative to total number of all eucalypt species present Plus canopy projective foliage cover	Field based assessment using DBH, , VCA method for recruitment & aerial imagery	Forty-spotted pardalote habitat plots (Bryant 2010).	Accepted surrogates for forty-spot foraging & nesting habitat **Canopy condition** Decline <=30%, Average 30-40% Good >40% **Recruitment** Inadequate - Class 1 < 10% total eucalypt species

Attribute	Method	Data source	Origin	Justification
	Forty spot nesting – as per hollow dwelling habitat			Adequate - Class 1 > 10% total eucalypt species **Density of habitat** Very low <10% white gums Low 10--30 % white gums Medium 30-65% white gums High >65% white gums
Swift parrot foraging habitat	Swift parrot foraging Number of eucs <40cm DBH/ha Number of blue gums & black gums <40cm DBH /ha Number of eucs >40cm DBH/ha Number of blue gums & black gums >40cm DBH /ha	Field based assessment using FPA methodology based on dbh as surrogate Aerial imagery	Swift parrot foraging habitat method (Forest Practices Authority 2012)	Accepted methodology for estimating current and future potential swift parrot foraging habitat High = >50% of the stems over 40cm dbh in any 1 ha patch are foraging-trees Medium = 20-50% of the stems over 40cm dbh in any 1 ha patch are foraging-trees Low (dry forest) = 1-19% of the stems over 40cm dbh in any 1 ha patch are foraging-trees Low (wet forest) = 10-20% of the stems over 40cm dbh in any 1 ha patch are foraging trees
Swift parrot breeding habitat	As per hollow dwelling habitat	Field based assessment using DBH, VCA method for recruitment & aerial imagery	Mature Habitat method (Forest Practices Authority 2012)	Accepted surrogates for swift parrot breeding habitat
Chaostola skipper habitat	Location & cover of *Gahnia radula*	Field based assessment using gps, Braun-Blanquet cover classes *& photo-monitoring	Chaostola skipper thabitat method (Threatened Species Section 2012a)	<10% cover = sparse (<1-5m/2) 10-50 = medium (>5-15/m2) 50+ = dense (>15/m2)
General fauna habitat	Presence/absence of various indicators of habitat including scats, diggings, burrows, hollows	Field based assessment	Seemed like a good idea but not convinced it is very useful!	Surrogates for general habitat
Rocks (%)	Estimate the % cover of rocks in an area (as per Habitat Hectares)	Field based assessment	Seemed like a good idea but not convinced it is very useful!	Surrogates for general habitat
Active Management				Insert management actions as per Part 5 Agreement

Field data sheets for Part 5 monitoring

Address

PID ……………………………

Agreement # ………………………………………………………………………………………

Conservation Area Size (ha)

Recorder ……………………………………………………………………………………………………..

Date ………**Attribute**	**Zone #**	**Zone #**	**Zone #**	**Zone #**	**Zone #**
Native vegetation					
Current Extent (ha) (post-field)					
Change in extent (post-field)					
TASVEG Community					
Structural condition					
Number of large trees					
Canopy health of large trees					
% of trees with senescent characteristics					
Canopy health (5% increments, with greatest being >75%)					
Projective foliage cover (%)					
Logs (m)					
Large logs (m)					
Large stumps #/ha					
Small stumps #/ha					
Grazing					
Slashing					
Fire					
Vegetation Composition					
Weeds					
Map weeds (Y/N)					
Weed cover (0, <1, 1-5, 510, 10-25, 25-50, 50-75, >75%)					
Native Vegetation Cover					
Mid-storey native cover (5% increments)					

Date …………………………………………………………**Attribute**	**Zone #**	**Zone #**	**Zone #**	**Zone #**	**Zone #**
Understorey native cover (5% increments)					
Organic Litter (% cover)					
Organic Litter (native/non-native)					
% Bare Ground					
Disease					
Phytophthora cinnamomi presence					
Special Values					
Threatened flora					
Populations distribution/extent of populations					
Population size/density					
Threatened fauna habitat					
Hollow dwelling habitat – as per large trees					
Forty-spotted pardalote habitat					
# Eucalypts >10cm/ha					
Class 1 white gums (10-30cm DBH)/ha					
Class 2 white gums (>30-benchmark DBH)/ha					
Class 3 white gums (>benchmark DBH)/ha					
Swift parrot habitat					
# Eucalypts >40cm/ha					
Swift parrot foraging habitat (blue gums & black gums >40cm/ha)					
Chaostola skipper habitat					
Map Gahnia radula (Y/N)					
Gahnia cover (0, <1, 1-5, 5-25 and >25%)					
Mt Mangana Stag Beetle					
As per FPA tech note					
General fauna habitat					
Rocks (% cover)					
Scats (presence/absence)					
Diggings (presence/absence)					
Comments					

Part 5 Management					
Specific Part 5 Terms					
Protection of forty-spotted pardalote habitat Retain all white gums – standing & fallen No firewood collection Retain white gums within house sites or offset with natural recruitment or planting					
Clearance of native vegetation restricted to building envelopes & BMZ except footways & fence lines					
Introduced plants only planted within building envelopes					
No introduced or exotic plants naturalised in the bushland area					
Structures & buildings limited to building envelopes					
Facilitate natural recruitment					
Comments					

Record waypoints for the following:

- Photo-monitoring points/assessment zone centroid
- Eucalypt trees >= the benchmark (waypoint # , species & dbh)
- If forty-spot habitat, all eucs >=10cm (waypoint # , species & dbh)
- If swift parrot habitat, all eucs >=40cm (waypoint # , species & dbh)
- Threatened species populations (waypoint # and Braun-Blanquet distribution pattern, point, clumped, scattered, continuous)
- Weed populations (waypoint # and Braun-Blanquet distribution pattern, point, clumped, scattered, continuous)

Waypoint #	Attribute	Measure	Comment

Appendix VIII - Concepts of biodiversity in planning schemes and interviews

Table 1: Concepts of biodiversity in planning schemes

Concepts of biodiversity	Percentage of planning schemes identifying the concept	Percentage of planning schemes considering the concept
Environmental surrogates		
Habitat	93	90
Threatened species habitat	37.9	34.5
Threatened fauna habitat	34.5	34.5
Important habitat for threatened species	34.5	17.2
Habitat value	31.0	0.0
Habitat	24.1	24.1
Priority habitat	24.1	24.1
Critical habitats	20.7	0
Other habitat for threatened species	13.8	13.8
Migratory species - actual or potential habitat	6.9	3.4
Critical habitat for threatened species	3.4	3.4
Habitat for hollow dwelling species	3.4	3.4
Habitat of significance	3.4	3.4
High conservation value trees	3.4	3.4
Highly significant actual or potential habitat for threatened species	3.4	3.4
Known or potential habitat for threatened species	3.4	3.4
Moderately significant actual or potential habitat for threatened species	3.4	3.4
Other fauna habitat	3.4	3.4
Potential habitat for threatened species	3.4	3.4
Significant habitat for threatened species	3.4	3.4
Important habitats	3.4	0
Vegetation assemblages	93	86
Threatened native vegetation communities	69	69
EPBC listed communities	65.6	41.4
Native vegetation	58.6	58.6
Native vegetation communities	31	27.6
Bioregionally threatened communities	24.1	24.1
Priority vegetation communities	24.1	24.1
Vegetation communities	20.7	20.7
Priority vegetation	3.4	3.4
Ecological communities	3.4	3.4
Process and function	100	97
Riparian & coastal vegetation	96.6	96.6
Natural processes	44.8	0
Ecological function	41.4	0

Ecological processes	34.5	0
Extent	24.1	24.1
Quality	24.1	24.1
Wildlife corridor	24.1	24.1
Condition	24.1	0
Connectivity	24.1	0
Clearing bias	3.4	3.4
Less than 30% native vegetation within 1km	3.4	3.4
Remnant vegetation	3.4	3.4
Ecosystems	3.4	0
Taxonomic surrogates		
Species	90	69
Threatened species	69	41.4
Threatened flora	58.6	41.4
Conservation status	37.9	13.8
Threatened fauna	31	10.3
Number	24.1	0.0
Wildlife	31	31
Species	24.1	24.1
Species diversity	20.7	20.7
Known locations	6.9	6.9
Priority species	6.9	6.9
Genetic diversity	3.4	0.0
Other surrogates		
Other biodiversity values of local significance	34.5	31
High priority biodiversity values	34.5	31
Low priority biodiversity values	31	27.6
Moderate priority biodiversity values	27.6	27.6
Ecologically significant areas	3.4	3.4
Reservoirs of biodiversity	3.4	0.0

Table 2: Concepts of biodiversity identified by interviewees

Concepts of biodiversity	Percentage of interviewees identifying the concept	Number of interviewees identifying the concept
Environmental surrogates		
Habitat	78	28
Habitat	42	15
Individual trees	33	12
Threatened species habitat	22	8
Critical habitat	8	3
Old growth & mature forest	14	5
Hollows	11	4
Understorey	8	3
Priority habitat	3	1
Vegetation assemblages	86	31
Threatened native vegetation communities	83	30
Native vegetation	25	9
Grasslands	17	6
Non-priority vegetation	17	6
Vegetation community	14	5
Nonforest	6	2
Wetlands	3	1
Process & function	69	25
Connectivity	39	14
Urban remnants	25	9
Corridors	22	8
Landscape function	14	5
Riparian values	14	5
Coastal	11	4
Buffers	8	3
Ecosystems	8	3
Remnants	8	3
Ecosystem services	3	1
Pattern	3	1
Wildlife corridors	3	1
Taxonomic surrogates		
Species	94	34
Threatened species	94	34
Threatened fauna	53	19
Raptors	31	11
Swift parrots	31	11
Burrowing crayfish	14	5
Devils	8	3
Grey goshawk	8	3

Forty-spots	6	2
Stag beetles	6	2
Green & gold frog	3	1
Quolls	3	1
Velvet worm	3	1
Threatened flora	11	4
Orchids	8	3
Fauna	17	6
Flora	11	4
Common species	6	2
Mobile species	6	2
Sedentary species	6	2
Non-threatened species	3	1
Other		
Local or community value	37	13